

UNION OF SOUTH AFRICA.

PROVINCE OF THE CAPE OF GOOD HOPE.

MARINE
BIOLOGICAL REPORT
No. 3.

FOR THE YEAR ENDING
30TH JUNE, 1916.

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To be presented to the Provincial Council.

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[C.P. 3—1916.]

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PROVINCIAL SECRETARY,

SIR,—I have the honour to submit the following Reports in connection with the fishery investigations in the Cape Province. These deal with the more scientific questions of fishery work, which it is desirable to put on record, the more practical and administrative work being dealt with elsewhere. The nature and mode of occurrence of the eggs and larvæ of Cape fishes have recently given rise to considerable trouble in connection with netting operations, and the first Report dealing with this subject will be of assistance in this enquiry. Additional evidence as to the probable causes of the fluctuations in the fish supply are given in the second Report. Further Reports are given on the habits of certain marine animals, and on the work accomplished with the aid of the Marine Laboratory at St. James. Four new South African fishes are described and figured and two annexures are added, one on the local names of fishes the variety of which has given rise to much confusion, and the other a continuation of the useful Catalogue of Cape Fishes. These annexures have been drawn up by Mr. Romer Robinson and Mr. Wardlaw Thompson, F.L.S., F.Z.S.

I have the honour to be,

Sir,

Your obedient Servant,

J. D. F. GILCHRIST.

Cape Town,
30th June, 1916.

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UNION OF SOUTH AFRICA.

MARINE BIOLOGICAL REPORT.

I.—EGGS AND LARVÆ OF CAPE FISHES.

In this country as elsewhere many, if not most, of the difficulties which arise in fishery matter are connected directly or indirectly with the nature of the eggs and young of fishes, and one of the first lines of investigation, initiated about 1896 by the Cape Government in connection with the development of the fisheries, was in the direction of obtaining information on this point. The eggs and young of many of the commoner fish of economic importance are now known, but much remains to be learned with regard to the life histories of most of the Cape fishes.

The following contains a brief review of what has already been ascertained and recorded, as also some identifications of eggs and larvæ already described; additional descriptions of eggs and larvæ which have been subsequently observed, but not yet recorded, are also given.

The species dealt with are as follows :—

PRISTIPOMATIDÆ.

1. *Dentex argyrozona*, C. & V. (Silverfish, Kapenaar).
2. *Dentex albus*, Gilch. & Thomp. (Wit-visch, Sandfish).

SPARIDÆ.

3. *Chrysophys globiceps*, C. & V. (White Stumpnose).
4. *Chrysophys gibbiceps*, C. & V. (Red Stumpnose).
5. *Sargus capensis*, Günth. (Dasje, Black-tail).
6. *Pagrus lanarius*, C. & V. (Panga, Dik-bekje).
7. *Pagellus mormyrus*, Linn. (Zee Basje, Zeverrim).
8. *Gymnocrotaphus curvidens*, Günth. (John Brown).
9. *Cantharus blochii*, C. & V. (Hottentot).

TRIGLIDÆ.

10. *Trigla kumu*, Less. (Knorhaan, Gurnard).
11. *Agriopus spinifer*, Günth. (Horsefish).

SCIAENIDÆ.

12. *Sciaena aquila*, Risso (Kabeljaauw).

TRICHIURIDÆ.

13. *Thyrsites atun*, Euphr. (Snoek).

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CARANGIDAE.

- 14. *Caranx trachurus*, Lacép. (Maasbanker).
- 15. *Seriola lalandii*, C. & V. (Keel-staart, Yellow-tail).
- 16. *Tennodon saltator*, Linn. (Elft).
- 17. *Lichia amia*, Linn. (Leer-visch).

SCOMBRIDAE.

- 18. *Stromateus microchirus* (Blue fish, Pampelmoes, Cape Lady).

GOBIIDAE.

- 19. *Gobius nudiceps*, C. & V. (Dik-kop).

BLENNIIDAE.

- 20. *Clinus superciliosus*, Linn. (Klip-fish).
- 21. *Blennius cornutus*, Linn. (Bijter).

MUGILIDAE.

- 22. *Mugil auratus* (Harder, Blue-tailed Mullet).

GOBIESOCIDAE.

- 23. *Chorisochismus dentex*, Pall. (Klip-zuiger, Sucker-fish).

CICHLIDAE.

- 24. *Tilapia* spp. (Kurper).

GADIDAE.

- 25. *Merluccius capensis*, Pappe (Stockfish).
- 26. *Cataetyx messieri*, Günth.
- 27. *Macrurus fasciatus*, Günth.
- 28. *Macrurus parallelus*, Günth.

PLEURONECTIDAE.

- 29. *Synaptura pectoralis*, Kaup. (Tong, Sole).
- 30. *Synaptura microlepis*, Blkr.
- 31. *Achirus capensis*, Kaup.
- 32. *Arnoglossus capensis*, Blgr.
- 33. *Solea capensis*, Gilchr.

SILURIDAE.

- 34. *Galeichthys feliceps*, C. & V. (White Barbel).
- 35. *Galeichthys ater*, Cast. (Black Barbel).

SCOMBRESOCIDAE.

- 36. *Scombrosox saurus*, Walb.

CLUPEIDAE.

- 37. *Clupea sagax*, Jenyns (Sardine, Pilchard).
- 38. *Engraulis capensis*, Gilchr. (Anchovy).

PRISTIPOMATIDAE.

This family is represented in Cape Seas chiefly by the Silver-fish (*Dentex argyrozona*). The Seventy-four (*Dentex undulatus*) is also of importance in Cape Province, but is most abundant on the Coast of Natal, where it is one of the commonest of the market fishes. The Grunter (*Pristipoma benettii*), the Tiger-fish of Algoa Bay (*P. operculare*), and the Wit-visch (*Dentex albus*) are next in importance.

Dentex argyrozona, C. & V.*(Silver-fish, Dopje, Kapenaar Rooitje.)*

This fish is one of the most abundant on the South Coast at Cape Town and Mossel Bay. It is also found at Port Elizabeth, where it is known as the "Kapenaar." Very large specimens are occasionally procured in deeper waters, these being known as "Loopende" or Running Silver-fish. Small specimens, which appear to be immature, are often caught in the shallow water, and are known as "Dopjes."

The eggs of this fish were procured and artificially fertilized about the middle of December. The diameter of the egg varies from .89 to .83 mm. The surface of the egg showed cross markings, which disappears as development proceeds. The yolk is clear and homogeneous. The oil globule is .2 mm in diameter.

The larva has greenish yellow pigment behind the eye, and slight spots of the same colour above the body, at the posterior angle of the rectum, and at the posterior end of the yolk sac at the oil globule. Black pigment occurs in slight traces between the rectum and end of tail under the body. Dorsal and ventral fins are without colour. The larva is on the whole characterised by feeble development of pigment. The anus is about half way between the tip of the snout and the end of the tail; the oil globule is postero-ventral in position. Anterior end of yolk sac usually under end of snout.

Dentex albus, Gilchr. & Thomp.*(Wit-visch, Sand-fish.)*

This fish is not very common at Cape Town, where it is known as the "Wit-visch." It is, however, fairly abundant at Mossel Bay, where it is known as the "Sand-fish." It is a reddish fish, but of a paler colour than some other red fish like it, and this probably is the origin of the name.

The ripe eggs were procured at Mossel Bay in the month of January. They were from .8 to .75 mm. in diameter, and had an oil globule measuring .16 in diameter. They are therefore decidedly smaller than those of the Silver-fish, both in diameter of egg and of oil-globule.

SPARIDAE.

This may be regarded as the most important group of fishes economically in the Cape Province—in variety if not in numbers. It includes the shallower water forms, found on rocky ground, and therefore affords better facilities for examination of eggs and larvæ. The eggs and larvæ of four species have been described, and to these we now add the eggs of another three.

[C.P. 3—1916]

Chrysophrys globiceps, C. & V.*(White Stumpnose.)*

This is one of the commonest of sea fish on the West and South Coasts. It is to be distinguished from the fish *Chrysophrys holubi* also known as the "White Stumpnose," which occurs in abundance closer inshore, particularly in the shallow water of such places as the Berg River, Knysna Harbour and the Zwartkops River; these are not distinguished in fishery returns, and it would be well to designate the one as the "Sea-White-Stumpnose" and the other as the "River-White-Stumpnose," the former being distinguished from the latter by the presence of well marked black bands running across the body; these are absent in the latter, which has also in the fresh state a more or less distinct broad yellow band running along the side of the body.

The male "Sea-White Stumpnose" is distinguishable from the female externally by being of a somewhat darker colour and by having the ventral surface of the body (between the ventral fins) of a blue colour, not white as in the female.

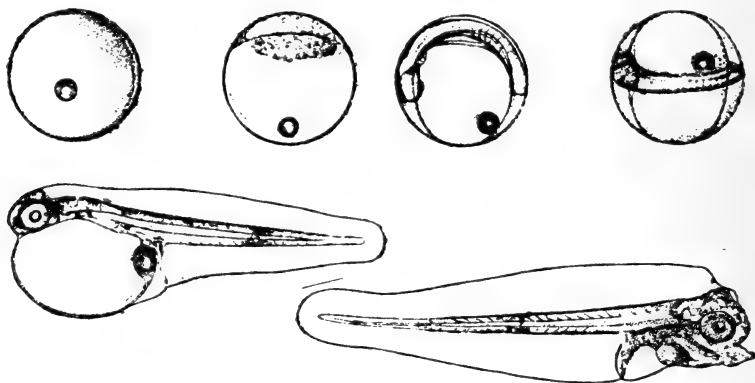


FIG 1.—Eggs and larvæ of the White Stumpnose at various stages of development.

Ripe males and females of this fish have been found in abundance in November and December. The eggs (fig. 1) are clear and transparent, the surface being somewhat corrugated. They vary from .89 to .85 mm. in diameter. There is one oil globule very uniform in diameter (.17 mm.).

The embryos (fig. 1)* hatch out in about 2 days after fertilization at a temperature of 65° F. The larva is about 2.5 mm. in length. Yellow pigment spots occur on the head, near the eyes above the yolk, and patches of yellow occur over and under the body. Two such patches occur above the rectum, and another two between the anus and the extremity of the tail. The oil globule is covered with reticulated pigment,

*Most of the figures illustrating this paper are about 20 times natural size.

and is usually posterior. A few dots of a black colour occur on the body and head. When the larva is six days old a marked change occurs as shown in the illustration.

***Chrysophrys gibbiceps*, C. & V.**

(*Red Stumpnose*.)

This fish is a typical warm-water Cape fish. It is rarely found in Table Bay and on the West Coast, but is fairly common in False Bay and along the South and East Coast to Algoa Bay and beyond. The male usually has a more prominent head than the female and sometimes this characteristic is highly developed. (*Vide* Marine Biological Report, No. 2, p. 99.)

The eggs (fig. 2) do not differ much in size from those of the White Stumpnose, being from .88 to .82 mm. in diameter; the oil globule is, however, larger, being .19 mm.

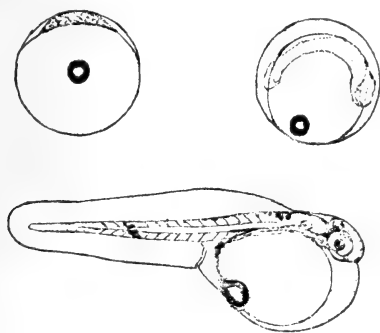


FIG. 2.—Eggs and larva of Red Stumpnose.

The newly hatched larva (fig. 2) can be distinguished from that of the White Stumpnose. Thus the oil globule is usually postero-ventral in position. The dorsal fin arises in a more posterior position, and there is a pigment spot below the body in front of the rectum, not behind it as in the larval White Stumpnose.

The body of the larva is characteristically coloured with yellow and dark spots; of the yellow spots there are one to three behind the head, between the eyes and the otocyst, one on the body over the centre of the yolk, one at the angle between the body and the posterior margin of the yolk in front of the rectum, one superior to the latter on the body, and one or more on the inferior caudal region of the body. Dark spots occurred sparsely on the dorsal parts of the head and body.

***Sargus capensis*, Günth.**

(*Dasje*, *Blacktail*.)

This is a very common fish in Cape waters, and is mostly found in the shallow waters of bays and estuaries.

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Ripe eggs have been found in the summer months. They are clear, homogeneous and measure .89 mm. in diameter, with an oil globule of .21 mm. and are difficult therefore to distinguish from the eggs of the John Brown and the Snoek. The larva is unknown.

The eggs of the European *S. rondeletii*, of which some consider that the Cape fish is a mere variety, are somewhat similar, being about 1 mm. in diameter, with an oil globule of .18-.20 mm.

Pagrus lanarius, C. & V.

(*Panga, Dik-bekje.*)

This fish occurs abundantly from Cape Town to Port Elizabeth, where it is known as the Dik-bekje.

The eggs are 1.1 to .93 mm. in diameter with an oil globule of .2 to .19 mm. They were procured in March near Cape Infanta. Larger eggs, said by the fishermen who procured them at Kalk Bay to be those of a Panga, measured from 1.1 to 1.06 in diameter and had an oil globule of .2 mm. The larva is unknown.

Pagellus mormyrus, Linn.

(*Zee basje, Sand Steenbras, Zeverrim.*)

Though of commercial value this fish is not caught in great numbers.

Eggs were procured about the middle of January and artificially fertilized. They are clear and homogeneous and measure .88 mm. in diameter, with an oil globule .16 mm. in diameter.

The larva has a rather long yolk sac, extending from slightly in front of snout half way to the tail. The pigment spots are scattered diffusely over the body, and sometimes extend on to dorsal and anal fins. The oil globule is postero-ventral.

Gymnocrotaphus curvidens, Günth.

(*Jan Bruin, John Brown.*)

This is a rock fish not very frequently seen in the fish market.

Ripe ova were procured in False Bay about the end of September. They measured .9 mm. in diameter with an oil globule of .21 mm.

Cantharus blochii, C. & V.

(*Hottentot.*)

This is a common Cape fish more characteristic of the West than the South-East coast. Some ripe eggs procured measured 1.06 mm. with a single oil globule .21 to .25 mm. in diameter.

TRIGLIDAE.

The Jacopiver (*Sebastes capensis*), the Gurnard or Knorhaan (*Trigla*) and the Paarde-visch (*Agriopus*) are the chief representatives of this family at the Cape, the first two only being of economic importance and that to a limited extent.

Trigla kumu, Less.

(*Knorhaan*, Red Gurnard.)

The eggs (fig. 3) of these fish were procured and artificially fertilized in December. They are large, being 1.2 to 1.21 mm. in diameter with an oil globule of .23 mm. The oil globule has a dark rim, and the yolk becomes very soon covered by a network of yellow and black stellate pigment spots.

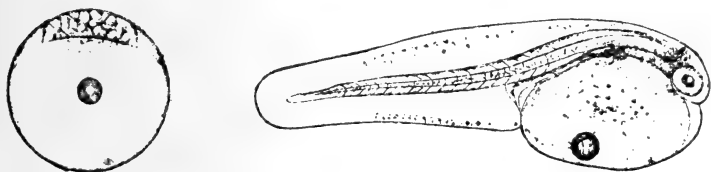


FIG. 3.—Egg and larva of Red Gurnard.

The larva (fig. 3) is characteristically pigmented. The head and body are covered with yellow stellate cells and just within the margin of dorsal and anal fins there is a band of yellow stellate pigment spots. The posterior extremity of the body and fins are, however, devoid of pigment. The pectoral fin appears early and is devoid of pigment.

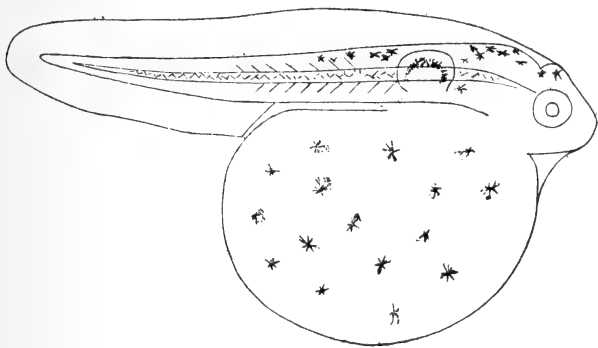


FIG. 4.—Larva of Horse-fish.

Agriopus spinifer, Smith.

(*Paarde-visch*, Horse-fish.)

Ripe eggs of this fish were procured in the month of November in False Bay. They measured from 1.83 to 1.74 mm.

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in diameter. The yolk is clear and homogeneous, the surface of the egg has a corrugated appearance. None of the embryos hatched out normally. One in an advanced stage, dissected out, showed dark pigment cells over yolk, head, body and pectoral fins (fig. 4).

SCIAENIDAE.

This family contains two of the most important of Cape fishes, the Kabeljaauw (*Sciaena aquila*) and the Geelbek or Cape Salmon (*Otolithus aequidens*).

Sciaena aquila, Risso.

(*Kabeljaauw*.)

The eggs of this fish were procured in a mature condition in the summer months. They measure from .91 (exceptional) to .82 mm. in diameter, and have a rather large oil globule, .2 mm. in diameter. They may be distinguished from the eggs of the White Stumpnose by the larger diameter of the oil globule.

TRICHIURIDAE.

This family of fishes is only of importance economically in the Southern Hemisphere, where it is represented by the Snoek of South Africa, called "Barracouta" in Australia (*Thyrsites atun*).

Thyrsites atun, Euphr.

(*Snoek*.)

This fish appears in the colder waters of the Cape (West Coast) in great numbers towards the end of the summer months. It feeds chiefly on sardines and becomes fat and in good condition. Towards the end of the winter months it is in full roe, and ripe eggs have been procured in the month of September. They are clear and homogeneous, measuring from .84 to .8 mm. in diameter, with an oil globule measuring from .25 to .21 mm. in diameter. These eggs are small, transparent, and float in the water at or near the surface as all the eggs above-mentioned do. Cape fishermen are firmly convinced that the red masses of *Noctiluca*, which often appear on the surface of the sea, are the eggs of Snoek.

CARANGIDAE.

The Maasbanker or Horse Mackerel (*Caranx trachurus*), the Albacore (*Seriola lalandii*), the Elft or Shed (*Tennodon saltator*) and the Leervisch (*Lichia amia*) are the most prominent fishes in this family in South Africa.

Caranx trachurus, Lacep.*(Maasbanker, Horse Mackerel.)*

This is one of the South African fishes which is believed to be identical with a fish of the same name in the Northern Hemisphere. The mature eggs are not known with certainty in South Africa, but an egg and the larva hatched out from it and described as Species IV. (Mar. Inv. S. Africa Vol. II., p. 197) seem to resemble the known eggs and larva of the Northern form so closely, that they may be taken as belonging to the southern representative.

The diameter of this egg was 1.44 mm. and the oil globule .29 mm. This is decidedly larger than that of the Northern form, which is from 1.04 to .84 mm. with an oil globule of .28 mm. The diameter of the egg of the Northern forms, however, varies very much, and Holt (Rech. Rep. Poiss. Osseux, p. 28), points out that it may vary from 1.09 in the North Sea to .76 in the Mediterranean.

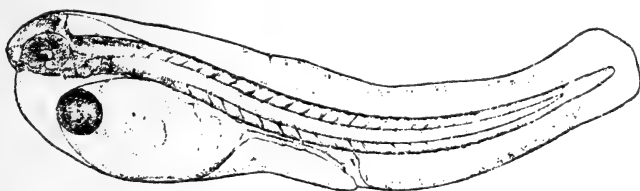


FIG. 5.—Larva of Maasbanker.

It is in the larva (fig. 5) that the most striking resemblances are found. There was a dense network of yellow pigment along the dorsal and anal fin, the oil globule was situated anteriorly and had a few yellow pigment spots. Black pigment spots occurred over and behind the head, on the oil globule, below the body from otocyst to rectum, and a few on the postero-inferior margin of the yolk sac. The yolk was vesiculated and the anus was situated well behind the yolk sac, in the posterior half of the total length of the body. These characters of the larva correspond so closely with the well characterised larva of the Northern species as described by Holt, Heincke and Ehrenbaum, that there can be little doubt that it belongs to the South African "Maasbanker."

Seriola lalandii, C. & V.*(Geelstaart, Albacore.)*

This fish is not uncommon at Cape Town and Kalk Bay. In the month of February an individual with ripe ova was procured. These measured (preserved in formalin) 1.27 mm. in diameter and had a single oil globule measuring .34 mm. in diameter.

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Temnodon saltator, L.

(Elft, Shad.)

Neither the eggs nor young of this ubiquitous fish have been found in South Africa. Agassiz and Whitman (Mem. Mus. Comp. Zool. Harvard Coll., Vol. XIV, 1, 1885) have described the young of this form (= *Pomatomus saltatrix*, Gill.)

Lichia amia, Linn.

(Leer-visch, Garrick.)

Various post-larval stages of this fish, originally described (C. & V. IX., p. 265) as a distinct species, *Porthmeus argenteus*, have been procured in nettings in the Zwartkops River, but no eggs nor larvæ.

SCOMBRIDAE.

This family is represented in South Africa chiefly by the Mackerel (*Scomber colias*), which is very abundant, but its eggs and larvæ have not yet been identified. Another fish which has a great variety of local names (*Stromateus microchirus*) is much rarer but is highly prized on account of its delicate flavour.

Stromateus microchirus, Bonap.

(Pampelmoes, Blue-fish, Butter-fish, Cape Lady.)

The ripe eggs were procured and fertilized in the month of February at Mossel Bay. They vary in diameter from .85 to .81 mm. Several oil globules are present. The larva (fig. 6) is characteristically short (about 1.5 mm.) and deep.



FIG. 6.—Larva of Pampelmoes.

The posterior border of the yolk falls within the first half of the body, the rectum is remote from the yolk. The eggs and larvæ were preserved in formalin, and further details could not be made out with certainty.

GOBIIDAE.

The Gobies are well represented in South Africa, where they are popularly known as "Dik-kops," and have the reputation of being poisonous. So far as known they have the same spawning habits, as their representatives in the Northern Hemisphere. Their eggs being of an elongate, more or less oval shape, and attached to stones, etc.

Gobius nudiceps, C. & V.

(*Dik-kop.*)

This is the only species whose eggs have been identified with certainty. They were deposited on the glass front of one of the tanks at the Marine Laboratory, St. James, the only fish in the tank being this *Dik-kop*. These eggs (fig. 7) were 1.8 mm.

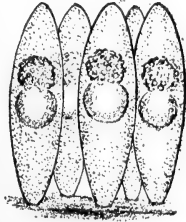


FIG. 7.—Attached eggs of *Dik-kop* (*Gobius nudiceps*).

in total length and .54 mm. in greatest diameter. At the top they ended in a rounded point, similar to the basal end, which was attached to the substratum by a fimbriated collar.

BLENNIIDAE.

The Blennies of South Africa are very numerous, being represented by seven genera containing thirty-six species. The genus *Clinus* (the *Klip-fish* of South Africa) contains twenty-two of these species.

***Clinus superciliosus*, Linn.**

(*Klip-fish.*)

This is the commonest species, and is very abundant around the coast of the Cape Peninsula. It is generally called the *Klip-fish*, with a commonsense disregard of bilingual niceties.

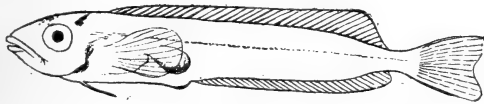


FIG. 8.—Young of *Klip-fish* showing air bladder.

This species and one or two more, as is well known, are viviparous. The young (fig. 8) are characterised by having a well-developed air bladder, which is absent in the adult.

***Blennius cornutus*, Linn.**

(*Bijter, Blenny.*)

Of the seven species of Blennies, this is the only one whose eggs have been identified with certainty. This was rendered possible by finding the fish in an empty barnacle shell with the eggs deposited in the inner surface of the shell. The fish

resolutely refused to leave its eggs, even when removed from the water. It lay in the shell in the position shown in fig. 9, and kept up a circulation of water over the eggs by a continuous fanning movement of its large pectoral fins. The eggs were circular in outline and were devoid of colour.

Such eggs have been already found in a barnacle shell and elsewhere, but differ from them in being of a vivid blue colour (Mar. Inv. S. Africa, Vol. II, p. 195). In all probability these were also the eggs of a Blenny. They were described as Species II.

MUGILIDAE.

The Mulletts or Harders are well represented in South Africa, the commonest being *Mugil capito* and *Mugil auratus*, both of which are also found in European seas. From a practical point of view it is of importance to ascertain the nature of the eggs and young of these fish, on account of the alleged destruction caused by some method of fishing in the rivers of South Africa. We naturally look for some useful information, therefore, on this subject from the extensive investigations which have been carried out in Europe, but for some unexplained reason it has been found extremely difficult to procure and examine the eggs and young of this fish. Raffaele has procured artificially-fertilized eggs of a Mullet, probably *M. capito*, 1 mm. in diameter, and with a large oil globule .2 mm. in diameter. The larva was well characterized; the posterior oil globule was about a third of the size of the yolk, and the rectum was situated well behind the yolk. Marion, Holt and Cunningham have found larvæ which from their resemblance to the above are probably the young of a species of *Mugil*. Ehrenbaum suggests that the reason why it has proved so difficult to procure information on this point is that the eggs of the Mullet may be deposited occasionally or regularly in brackish water, in which they would tend to sink to the bottom.

The eggs of the South African *M. auratus* have been obtained in a mature condition, but only from one specimen out of many hundreds examined. On the 23rd October the egg of the blue-tailed Mullet (*M. auratus*) were got. They measured about 1 mm. (to be accurate .997 mm.) in diameter, and some of them had a single oil globule .25 mm. in diameter; others had a number of smaller oil globules measuring from .16 to .04 in diameter.

GOBIESOCIDAE.

This family is represented by various kinds of "Suckers" (*Lepadogaster*) in Europe and by single species *Chorisochismus dentex* in S. Africa.

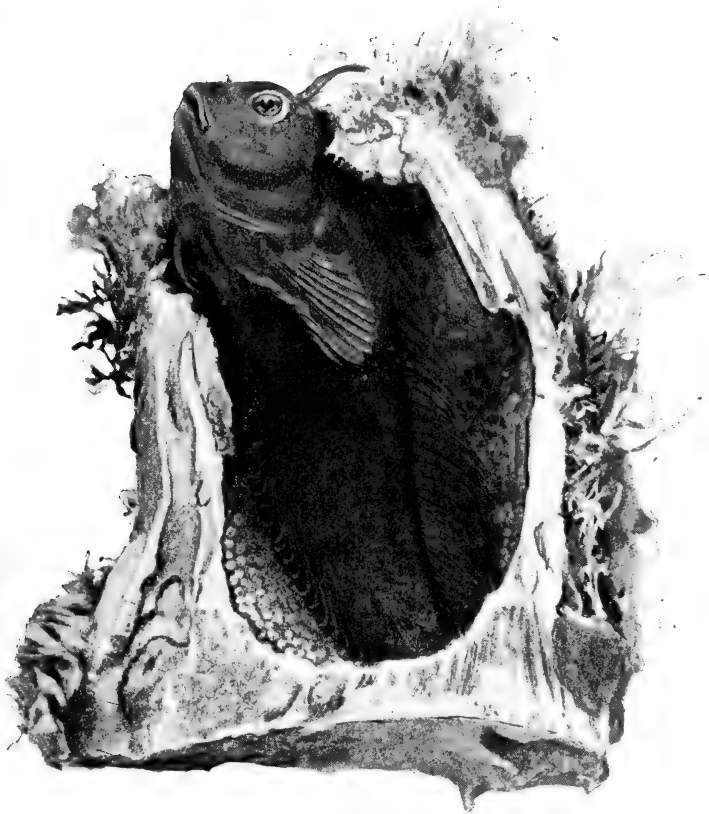


FIG. 9.—The Bijter (*Blennius cornutus*) and its nest, consisting of the shell of a barnacle. The shell has been cut away at the side to show the eggs deposited by the fish on its walls. (From a photograph.)

Chorisochismus dentex, Pall.*(Klip-zuiger, Sucker-fish.)*

In the months of November and December, 1902, groups of eggs (fig. 10) were found in dredging in False Bay and described as Species I. (Mar. Inv., Vol. II., p. 193). These were attached to shells and stones. They were clear and unpigmented except for the dark eyes of the developing embryo, which were found



FIG. 10.—Eggs and larva of Klip-zuiger. The eggs appear as clear circular patches attached to a stone. They are represented in natural size; the larva is enlarged.

in some of the eggs. They were about 1 mm. in diameter and somewhat oval in shape, varying from 1.37 x .97 mm. to 1.06 x .98 mm. The eggs in their early stage were finely granular, and contained numerous small oil globules, though in later stages one to five large oil globules were seen.

The period of incubation was seventeen days from the time of the appearance of the first few divisions of the germinal disc (the earliest stage observed) to the time of hatching.

In the newly-hatched larva (fig. 10) the pectoral fins are well developed, the otocyst is large, the yolk sac is comparatively small. Along each side of the body are two rows of bright yellow spots from the pectoral fin to some distance behind the vent. Black pigment spots occur irregularly amongst the yellow spots, on the visceral region, and on the anal fin behind the vent. These spots become stellate on the following day.

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At a later date a number of young fish, procured in a tow-net in False Bay on the 13th October, 1898, were examined, and these consisted of a series of stages, the youngest of which was apparently identical with the larva above described, while the more advanced forms resembled the Klip-Zuiger. As, however, the posterior half of the ventral disc had a free margin, which is not found in the adult Klip-Zuiger and no intermediate stages were procured, showing that these could be regarded with certainty as a transition stage, the eggs and larva could only be identified as probably belonging to some species of the *Gobiesocidae*.

The difficulty, however, seems to be now solved by the finding of a mass of eggs deposited in the month of September by a Klip-Zuiger in one of the tanks at the Marine Laboratory. These were apparently identical with the eggs procured in 1902. They were without colour, clear and with various oil globules varying from .08 mm. to a quarter of this size. They were slightly oval in outline and were 1.47 mm. in greatest diameter, with a height of .92 mm. They were securely attached to the substratum, and had a base of attached forming a projecting rim at its periphery. Unfortunately, they did not develop, being apparently unfertilized.

CICHLIDAE.

These fresh water fishes which occur in the Northern parts of South Africa may be mentioned on account of their peculiar breeding habits. They are represented chiefly by the genus *Tilapia* in which this peculiarity may readily be observed. The eggs are deposited in a cavity dug out by the parents. The eggs are then transferred to the mouth of the fish, in which they develop till they have reached a considerable size just as in the sea-fish *Galeichthys*, to be noted later on.

GADIDAE.

This family, so well represented in the fish markets of the Northern Hemisphere by the Cod, Haddock, Whiting, Hake, etc., is only represented commercially in South Africa by the last-named and by the rather rare "King-Klip-fish" (*Genypterus capensis*).

Merluccius capensis, Pappe.

(*Stok-visch*, *Stock-fish*.)

This fish, if not identical with the European Hake (*M. vulgaris*), as some believe, is closely allied to it, and its habits are very similar.

Mature eggs are not readily procurable, and in none of the many hundreds caught by the *Pieter Faure* were they to be found. On one occasion only were they got, from a fish in the Cape Town Market on the 8th April. They measured

from $\cdot 97$ to $\cdot 93$ in diameter, and had an oil globule $\cdot 25$ in diameter. Raffaele gives the dimension of *M. vulgaris* as $1\cdot 03$ to $\cdot 94$ mm. with an oil globule of $\cdot 27$ mm., and Holt found eggs from $1\cdot 55$ to $1\cdot 08$ mm. in diameter with an oil globule of $\cdot 30$. The eggs of the Cape species, therefore, are well within the range of the size of the European species, but on the whole slightly smaller, the oil globule being also smaller.

Of the known eggs of the Cape Fishes, those of the Snoek (*Thyrstites atun*) are nearest to those of the Stock-fish, as they measure $\cdot 98$ to $\cdot 93$ mm., oil globule $\cdot 25$ mm. The Kabeljauw (*Sciaena aquila*) has also an egg of about the same size, but with a smaller oil globule, being only $\cdot 2$ mm. in diameter. It may perhaps therefore be distinguished from the egg of the Kabeljauw, but not of the Snoek.

Cataetyx messieri, Günth.

This is a large deep-sea fish found by the *Pieter Faure* in about 600 fathoms of water off the Cape. One, procured in the month of December, had well-developed ovaries consisting of large reddish eggs, and amongst these were a number of larvæ (fig. 11). The fish is therefore viviparous like the

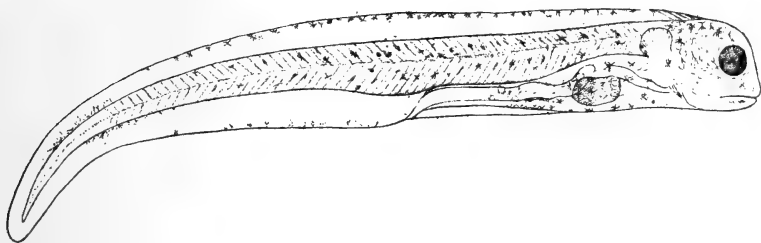


FIG. 11.—Larva of *Cataetyx messieri*, a deep-sea viviparous fish.

shallow-water Klip-fishes. The only other viviparous bony fish in South Africa is a fresh water *Barbus*, so that this condition is represented in the most varied environment.

Macrurus fasciatus, Günth.

A mature female of this fish was obtained in the month of October, off Cape Point, from about 100 fathoms. From it were procured clear homogeneous eggs of $1\cdot 15$ to $1\cdot 06$ mm. in diameter; an oil globule, of a yellow or reddish colour, measured from $\cdot 29$ to $\cdot 27$ mm., and the surface of the egg was covered with polygonal markings. These eggs floated on the surface of the water in which they were placed, but, as they were also found in the townets attached to the beam of the trawl fishing at depth varying from 91 to 1,000 fathoms, and never in surface townetting, it may be assumed that they do not ascend to the surface of the sea. (Mar. Inv. S. Africa, Vol. iii., p. 135, fig. 37.)

Macrurus parallelus, Günth.

The ripe eggs of this deep-sea fish were also found. They were from 1.32 to 1.3 mm. in diameter, with a single oil globule measuring from .31 to .28 mm. They have the same markings on their surface as those of *M. fasciatus*, but are of a decidedly larger size. None were found in the townetings. (Mar. Inv. S.A., Vol. iii., p. 136.)

PLEURONECTIDAE.

This family is well represented in South Africa, though the only one of great economic importance is *Synaptura pectoralis*, which occurs in great abundance on the trawling ground of the Agulhas Bank.

Synaptura pectoralis, Kaup.

(*Mud Sole*.)

The eggs of this fish are clear, homogeneous and vary from .83 to .72 mm. in diameter. There are usually several oil globules, up to 12 in number and from .04 to .15 mm., but there may (rarely) be a single one only.

The larvæ has dense yellow branching pigment spots on head, body and yolk. On or just within the border of the dorsal and anal fin is a continuous line of such spots, and midway between the rectum and posterior extremity is a band of the same colour across the body. Posterior to this band the larva is devoid of pigment.

Synaptura microlepis, Blkr.

This Sole has been found only on the West Coast, where *S. pectoralis* does not occur. Ripe eggs have not been procured from the fish, but it seems probable that an egg .82-.80 mm. in diameter, with 5-7 oil globules .12-.08 mm. in diameter, may belong to this fish. It was found on the West Coast (*vide* Mar. Biol. Rep. No. 2, p. 81).

Arnoglossus capensis, Blgr.

No ripe eggs were procured from this rather rare fish, but some eggs procured in townetings and the larvæ hatched



FIG. 12.—Larva of *Arnoglossus capensis*, a small flat fish found in False Bay.

out from them are so characteristic, and resemble so closely the European "Scaldfish" (*A. laterna*), that there can be little doubt as to their parentage.

The egg is small being only $\cdot 79$ mm. in diameter, and has a small oil globule $\cdot 11$ mm. in diameter. The larva (fig. 12) is of a characteristic brick-red colour, and the fins presented a tuberculate appearance, which is equally characteristic. The oil globule is posterior. (Mar. Inv. S.A., Vol. II., p. 133.)

Achirus capensis, Kaup.

Ripe eggs and spermatozoa of this small Sole were readily obtained in False Bay in November and December, but all attempts at artificial fertilization were invariably unsuccessful—the only case in which it has been so.

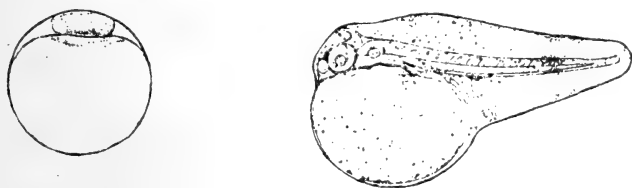


FIG. 13.—Egg and larva of *Achirus capensis*, a small S. African sole.

The eggs varied from $1\cdot 02$ to $\cdot 91$ mm. in diameter, and had no oil globule.

There is little doubt but that the eggs and larvæ (fig. 13) described as Species V. (Mar. Inv., Vol. II., p. 197) belong to this egg. These were also found in False Bay in December. The eggs were $\cdot 98$ mm. in diameter, with no oil globule. The larva was short and had a large yolk. The body, head, yolk, sac and fins were covered with yellow, finely-branching pigment cells, but the posterior end of the caudal was destitute of pigment.

Solea capensis, Gilchr.

A species of *Solea* (*S. capensis*) is found fairly abundantly in the shallower waters of False Bay. It has not been caught

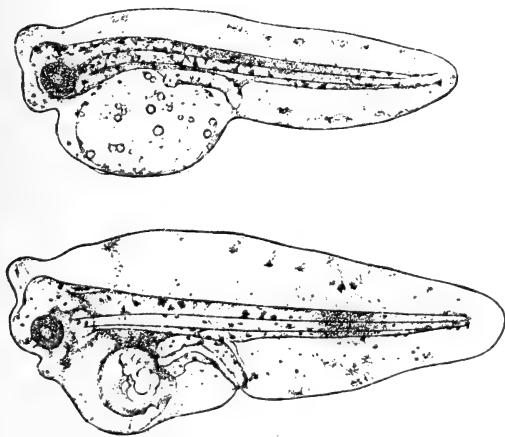


FIG. 14.—Young soles, probably *Solea capensis*.

in the trawl, but is frequently speared at low water by fishermen, who wade in and feel about with their feet for
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the fish. Another but smaller Sole (*S. fulvo-marginata*) is also found, but less frequently.

Certain eggs and larvæ found in townettings in False Bay have characters so similar to those described for the genus *Solea* that they can provisionally be assigned to that genus, probably *Solea capensis*.

The eggs were found in the month of December, 1902, and at later dates, and described as Species VII. They are about 1.32 mm. in diameter, and contains about 100 small oil globules from 1.01 to .06 mm. in diameter.

The larvæ (fig. 14) and yolk are covered with yellow stellate pigment spots in tufted groups, with a few black spots on the head and middle of the body (Mar. Inv., Vol. II., p. 198, figs. 29-31).

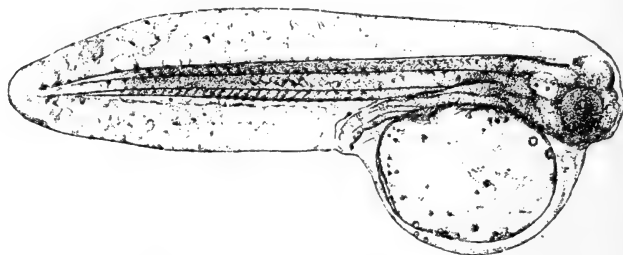


FIG. 15.—Larva of a species of Sole.

The well-characterised egg⁷ and larva (fig. 15) described as Species X. (Mar. Inv., Vol. II., p. 199) may be regarded provisionally as belonging to a species of *Solea*.

SILURIDAE.

This family is represented by two species of sea fishes at the Cape, the White Barger (*Galeichthys feliceps*) and the Black Barger (*G. ater*). They are possessed of strong spines, capable of inflicting serious wounds on account of some poisonous property they have. Otherwise the fish is of some food value. Their eggs and spawning habits are quite peculiar.

Galeichthys feliceps, C. & V.

(Barger, White or Brown Barger.)

Cape fishermen are convinced that this fish carries its eggs in its stomach and disgorges them on capture. That it has been observed with eggs in its mouth at various stages of development, and even with well-advanced young, has been known for some considerable time. There is little doubt but that the large eggs are laid in the usual way and subsequently taken into the capacious mouth of the fish where they undergo development, as is the case in the fresh-water *Tilapia*. It

is difficult to account for the persistent statement of fishermen that they have found the eggs in the stomach (see also Mar. Biol. Rep. No. 2, p. 82).

Galeichthys ater, Cast.

(*Black Barger.*)

This is more of a sea fish than the White Barger, and is not so frequently found in estuarine rivers. A specimen taken in False Bay had numerous eggs in its mouth, though of a smaller size than those of the White Barger.

CYPRINIDAE.

This family of fresh-water fishes is fairly well represented in South Africa, and nearly all probably have eggs which do not float but become adherent to weeds and other objects in the water, though this has been observed only in a few cases.

Barbus vulneratus, Cast.

Ripe eggs were procured from a specimen of this fish in the Baakens River, near Port Elizabeth, and were found when shed to adhere rather tenaciously on any object with which they were brought in contact.

Barbus viviparus, M. Web.

This fish brings forth its young alive like the sea Klip-fishes, as was first noted by Max Weber.

Labes capensis, A. Smith.

The ripe eggs of this fish were procured in the month of January at the Modder River, Cape Province. They were opaque, heavily-laden with yolk, and measured 1·7 mm. in diameter.

SCOMBRESOCIDAE.

The Gar-fish (*Belone*), common in the warmer waters of the East Coast, the Saury (*Scombresox*), the "Naald-visch" or Half-beak (*Hemiramphus*) and the Flying-fish (*Exocoetus*) are the chief representations of this family in S. Africa.

Scombresox saurus, Walb.

(*No local name.*)

The eggs of this fish were found about 34 miles off Cape Point in the months of July and September. They are very large for floating eggs, being 2·76 to 2·1 mm. in diameter. They are clear, homogeneous and without an oil globule. Probably on account of the large size of the egg the embryo is long in hatching (about a fortnight), and when it does so,

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it is so well advanced (about 8.5 mm. in length) that its parentage can even then be suspected. This can be made more or less certain by comparing it with various intermediate stages found in townettings and leading up to the adult form. The newly hatched larva is of a deep blue colour, the rectum is well behind the yolk. (Mar. Inv. Vol. III, p. 147). The eggs of this fish in the Northern Hemisphere have been described as having long filaments, and if the above identification is correct, of which there seems to be little doubt, it may prove that the S. African species are different from that of European seas.

CLUPEIDAE.

This family is most abundantly represented in S. Africa by the Sardijn or Sardine (*Clupea sagax*), by two species of Anchovy (*Eugraulis holodon* and *E. capensis*), and by *Elops machnata* called the "Cape Salmon" at Port Elizabeth and the "Springer" at Durban.

Clupea sagax, Jenyns.

(*Herring, Sardijn, Sardine, Pilchard.*)

The Cape Sardine is so similar to the European Pilchard, by which name it is sometimes known in S. Africa, that it might be described as a variety of this fish (*Clupea pilchardus*). It is also closely related to the Sardine of Australia, and this closely related group has of recent years been separated from the genus *Clupea* and called *Sardina*. *Sardina sagax* occurs not only in S. Africa but in Chile, California and Japan (Regan).

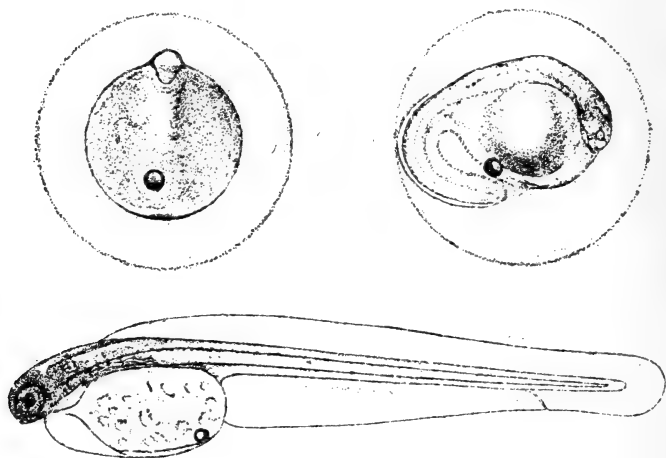


FIG. 16.—Eggs and larva of the South African Sardine (*Clupea sagax*).

The eggs and larvae of the European species are very well characterised and readily distinguishable from all others, and, as the eggs and larvae which I have described as Species iii.

(Mar. Inv. S. Africa, Vol. ii, p. 196) closely resemble them, there seems very little doubt that they belong to the S. African Pilchard.

These eggs (fig. 16) are very large being 1·7 in diameter, the perivitelline space is however also very large, so that the actual egg is only a little over 1 mm. in diameter. The yolk is vesiculate. The oil globule is comparatively small, being only ·2 mm. in diameter.

The larva (fig. 16) is very long, being 4·1 mm. in length. It is devoid of pigment, except for a few black spots over the body, and the rectum is in the posterior third of the body.

The eggs and larvæ of the Japanese species have been described by Kishinouye (Journ. Imp. Fisheries Bureau, Tokyo, xiv 1907) as similar to those of *C. pilchardus*.

Clupea, spp. ?

The egg and larva called Species VIII (Mar. Inv. Vol. ii, p. 199), seem to be long to some clupeoid fish. The egg was 1·06 mm. in diameter, with vesiculated yolk, but no oil globule.

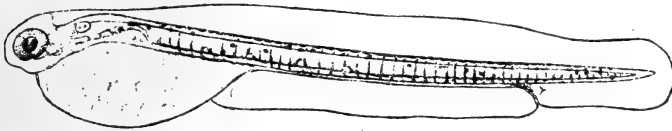


FIG. 17.—Larva of Clupeoid Fish.

The larva (fig. 17) was long (4·5 mm.), with only a few black spots and the rectum was posterior.

The egg described as Sp. XXII. (Mar. Biol. Rep. No. 2, p. 89) with its large perivitelline space though small size (·71 to ·72 mm.) vesiculated yolk and absence of oil globule, together with the larvæ which were elongate (1·5 to 1·8 mm.) almost colourless and with a posterior rectum, seem also to belong to the clupeoid type.

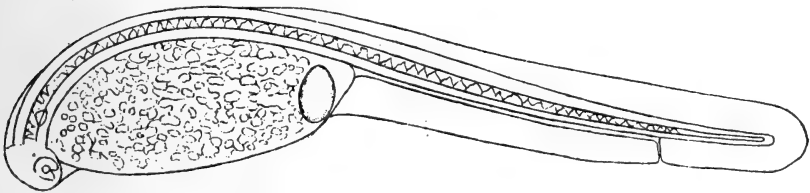


FIG. 18.—Larva of Clupeoid Fish.

Species XIII. with an egg measuring 1·7 mm., oil globule of ·32 mm., producing a long larva (fig. 18) with vesiculated yolk and posterior rectum, may also be placed in this group.

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Eugraulis capensis, Gilchr.

This Cape fish, like the Cape Sardine, is closely allied to a European species. Its eggs and larvæ have not yet been procured from the fish itself, which is seldom caught, but by comparison with the well known and well characterised eggs of the European *E. encrasicholus* certain eggs found in Cape waters can with probability be referred to the S. African species.

These eggs procured 6 miles off Mossel Bay in a townetting in the month of January were oval in shape, 1·12 mm. in length and ·50 mm. in breadth.

The larva of Species XX. somewhat resemble that of the European Anchovy in its elongate vesiculated yolk.

Elops machnata, Forsk.

(*Cape Salmon*, *Springer*).

The eggs and larvæ of this fish have not yet been procured. The larvæ are probably similar to the eel-like larva of *Elops saurus*, which is so closely allied to the Cape fish that the difference has not been recognised until lately (*vid.* Boulenger, *Fresh Water Fish of Africa*, Vol. iv).

The following table may serve as a key to the eggs and larvæ of all the South African fishes as yet described. It includes several kinds described in the Marine Investigations in South Africa, the determination of which has not yet been made, viz., Species VI, IX, XII, XIV, XV, XVI, XVII, XIX, XX, XXI. Of these XIV-XVI and XIX-XXI were procured about 40 miles off Cape Point where very deep water occurs. They were procured along with eggs of *Scombresox*, and probably belong to pelagic or deep sea fishes.

EGGS AND LARVAE OF SOUTH AFRICAN FISHES.

A.—FISHES WITH PELAGIC EGGS.

I. With one Oil Globule.

Egg.		LARVA.					
Diameter of Egg.	Diameter of Oil Globule.	Other Features.	Position of Oil Globule.	Position of Rectum.	Notochord.	Other Features.	Species.
.79	.11	..	Posterior	Anterior	Unicolumnar	Red pigment on body, fins and yolk.	Species XI = <i>Arnoglossus capensis</i> .
.81—	.16	..	..	..	..	..	<i>Dentex albus</i> .
.81—	.16 (?)	..	Anterior	Anterior	Multicolumnar	Slight pigment	Species VI.
.88—	.19	..	Posterior	Anterior	Multicolumnar	Moderate pigment on body	<i>Chrysophrys gibbiceps</i> .
.88	.16	..	Ventral	Anterior	Multicolumnar	Slight pigment ..	<i>Pagellus mormyrus</i> .
.89	.15	..	Posterior	Anterior	Multicolumnar	No pigment	Species XII.
.89—	.17	..	Posterior	Anterior	Multicolumnar	Moderate pigment on body	<i>Chrysophrys globiceps</i> .
.89	.21	..	..	..	..	..	<i>Sargus capensis</i> .
.90	.21	..	..	..	..	..	<i>Gymnocrotaphus curvidens</i> .
.91—	.82	About 10% have two oil globules.	Posterior	Anterior	Multicolumnar	..	<i>Sciæna aquila</i> .
.95	.23	..	..	..	..	..	<i>Thyrsites atun</i> .
.98—	.25	..	..	..	..	..	<i>Merluccius capensis</i> .
I	.25	..	..	..	..	..	<i>Mugil auratus</i> .
I .06	.25—	..	..	..	..	..	<i>Cantharus blochii</i> .
I .1	.25—	..	..	..	..	..	<i>Pagrus laniatus</i> .
I .1—	.25—	..	..	..	..	..	<i>Macurus fasciatus</i> .
I .15—	.27	Polygonal markings ..	..	Anterior (?)	..	Black branching cells from head to tail (in formalin).	

Diameter of Egg.	Diameter of Oil Globule.	Other Features.	Position of Oil Globule.	Position of Rectum.	Notochord.	Other Features.	Species.
1.21—1.07	.23	Yolk early pigmented ..	Ventral ..	Anterior ..	Multicolumnar ..	Pigment on body and fins ..	Trigla Kumu.
1.27	.34	..	..	..	..	..	Seriola lalandii.
1.32—1.3	.31—.26	Polygonal markings ..	Anterior ..	Median ..	..	Pigment abundant on body and fins.	Macrurus parallelus.
1.44	.29	..	..	..	..	Very little pigment ..	Species IV = Caranx trachurus.
1.7	.2	Large perivitelline space	Postero-ventral	Posterior	Unicolumnar	..	Species III = Clupea sagax.
1.7	.33	Yolk vesiculate ..	Posterior	Posterior	Multicolumnar	No pigment, anterior curvature.	Species XIII = Clupeoid ?
1.7	.38	Yolk vesiculate ..	Posterior	Anterior	Multicolumnar	Black tufts on fins ..	Species XIV.
1.87	.42—.38	Clear dots on surface (constant ?)	Posterior	Anterior	Multicolumnar	Yellow tufts on fins ..	Species XV.
1.91—1.7	.25—.21	Gelatinous envelope ..	..	..	..	..	Species XVI.

2. *With several Oil Globules.*
LARVA.

EGG.

Diameter of Egg.	Diameter of Oil Globule.	Other Features.	Position of Oil Globule.	Position of Rectum.	Notochord.	Other Features.	Species.
.85—	.17—.04	2-8 oil globules	..	Anterior	..	..	Stromateus microchirus.
.81—.72	.15—.04	From 1 (rare) to 12 oil globules	..	Anterior	..	Yellow pigment abundant on all parts except extremity of tail	Synaptura pectoralis.
.82—.80	.12—.08	5-7 oil globules	..	..	..	..	Synaptura microlepis ?

3. *With many Oil Globules.*
LARVA.

Egg.

Diameter of Egg.	Diameter of Oil Globule.	Other Features.	Position of Oil Globule.	Position of Rectum.	Notochord.	Other Features.	Species.
1.32	Anterior	Multicolumnar	Embryo and yolk with branching yellow pigment cells protuberance over head.	Species VII = Solea capensis?
1.57	..	Red pigment appears early on embryo	..	Anterior	Multicolumnar (?)	Abundant red pigment..	Species XVII.
1.78	..	Embryo and yolk sac with branching yellow cells	..	Anterior	Multicolumnar	Pigment on all parts ..	Species X = Solea ?

4. *With No Oil Globules.*

LARVA.

Egg.

Diameter of Egg.	Other Features.	Position of Rectum.	Notochord.	Other Features.	Species.
.72— .71	Vesiculated perivitelline space ..	Posterior	..	A few black spots along tail ..	Species XXII = Clupeoid ?
.76— .72	..	Anterior	Unicolumnar	Faint yellow pigment on all parts	Species XVII.
1.02— .91	..	Anterior	Multicolumnar	Dense pigment on yolk and larva	Species V = Achirus capensis.
1.06	Vesiculated ..	Posterior	Unicolumnar	A few black spots on body ..	Species VIII = Clupea sp. ?
1.12 x .50	..	..	..	..	Engraulis capensis.
1.83—1.74	Markings on vitelline membrane	Anterior	Multicolumnar	Yellow spots on embryo ..	Agriopus spinifer.
1.87—1.72	White, opaque ..	(?)	(?)	Blue on head and body ..	Species XIX.
2.76—2.1	Minute dots over surface, vitelline circulation.	Median	..	No pigment, elongate yolk.	Scombresox saurus.
2.97—2.64	Large perivitelline space, vesiculated yolk.	Median	Multicolumnar	Dorsal prominence ..	Species XX.
4.2—4	..	Median	Multicolumnar	..	Species XXI.

B.—FISHES WITH DEMERSAL EGGS.

EGG.			LARVA.		
Diameter of Egg.	Other Features.	Position of Rectum.	Notochord.	Other Features.	Species.
1	Dark blue	..	Multicolumnar	Little colour	Species II = <i>Blennius</i> sp.?
1	Unpigmented	..	..	..	<i>Blennius cornutus</i> .
1.47	Somewhat oval	..	Multicolumnar	Pigment abundant on body	Species I = <i>Chorisochismus dentex</i> .
1.8 x .54	In a cluster	..	..	..	<i>Gobius nudiceps</i> .
2	(demersal ?)	..	..	..	Species IX.

II.—AN ENQUIRY INTO THE FLUCTUATION IN THE FISH SUPPLY ON THE SOUTH AFRICAN COAST (continued).

In Report No. 2 an enquiry into the fluctuation in the fish supply on the South African coasts seemed to point to the conclusion that the peculiarities of the sea currents and temperatures were, in some cases at least, connected with the relative abundance of sea fish. The following additional notes on this subject may be of some assistance in this enquiry. They include :—

- (1) An apparent confirmation of the vagaries of sea temperatures and salinities, which occur in the sea in the neighbourhood of the Cape Peninsula, as shown in a connection between the state of the water and its power of conveying sound.
- (2) A further note on the periodical mortality of fish which occurs on the West coast in the neighbourhood of Walfish Bay (now known officially as Walvis Bay) drawn up by Mr. Gale, Superintendent of Works at that station, and an account of an occurrence observed there about the beginning of January, 1915.
- (3) Further information on the case of mortality among fish at Knysna in February, 1914, noted in the last Report, p. 27.
- (4) A case of mortality among freshwater fish.
- (5) Extensive mortality observed to occur in the case of the Cape Crawfish.

I. TEMPERATURE AND TRANSMISSION OF SOUND IN THE SEA.

Of recent years a good deal of attention has been directed to the question of the transmission of vibration through water so as to give information of the vicinity of land, etc. The vibration may be caused intentionally, by means of a submarine bell or other vibrating metal, or unintentionally by the screw of a submarine, and it may be detected at a distance by delicate microphones. Recently this method has been effective in warning ships of the proximity of land, and has been tried at various places on the coast of South Africa with success. In the waters on the West side of the Cape Peninsula repeated attempts have, however, proved a complete failure, or so uncertain in their results as to render the apparatus practically useless. At other places on the South African Coast the submarine bell could be easily detected at a distance of several miles (eight miles in False Bay and five miles in Algoa Bay), but in Table Bay it could not be detected at some times at a distance of three quarters of a mile. At

other times it could be heard at a greater distance. On one occasion it was heard distinctly at a distance of two and a quarter miles and it was thought that the difficulty had been overcome. On repeating this experiment, however, with the same apparatus and at the same place, no trace of the vibration from the bell could be picked up by the microphone. It was then suspected that currents might carry off the sound, but this explanation proved to be incorrect, for the sound of the bell was as indistinguishable on the one side as on the other.

The Lighthouse Engineer in charge of these experiments then made enquiries as to whether the investigations of the Government Trawler, the *Pieter Faure*, on the condition of the sea at various localities could throw some light on the difficulty. Fortunately, this was a point which had received special attention in these investigations, and some observations, made on the peculiar conditions of temperature and salinities of the sea on the West side of the Cape Peninsula, as compared with those elsewhere, even so close at hand as the East side of the Peninsula in False Bay, show that in the former locality there is a varying condition of temperature and salinities, not found at other places. This point of the South African coast is where there is an active intermingling of the warmer and denser waters of the Agulhas current with the colder and less dense water of the Antarctic current, and the observations show that there are layers of water of different temperatures and salinities which are probably constantly varying. Such a condition of things, might, by diffraction of the sound waves or the establishment of convection currents, tend to carry the sounds up to the surface or downwards to greater depths, deflecting them from a straight path which they would otherwise take under normal conditions. This, it would appear, affords a possible explanation.

2. THE MORTALITY OF FISH AT WALFISH BAY, SOUTH-WEST AFRICA.

(a) *Note by Mr. G. Gale, Superintendent of Works, Walfish Bay.*

"There is comparatively often, in Walfish Bay and its precincts, a period when the fish become dazed and some are thrown up, dying, on the beach. The reason why this is so seems to me to be quite apparent. The bay is surrounded on three sides by low-lying sandflats and in the Southern bight is a long lagoon, for the most part very shallow and also with low-lying and flat surroundings. The whole of this area is composed of sand, and not a single rock or stone protrudes above the surface. It is permeated with seawater and below the upper layer the loamy sand seems to turn into a black, stinking mud, which smells like, and no doubt contains much sulphuretted hydrogen. I have found that copper wire immersed in this is decomposed in a short time.

In a few places the sulphur grows up out of this, and appears on the surface in cakey deposits of pure sulphur, with sand particles in it. In other places, if the sand is examined with a magnifying glass, numerous grains of sulphur are visible. No doubt the bottom of the bay is of the same character, for when the anchor of a ship is let go, an abominable stench fills the air, of a sulphurous character. It is the existence of these mixtures in the mud in the bottom of the bay, which, in my opinion, causes the mortality amongst the fish. At ordinary times fish come into the bay and lagoon, for fishy reasons, and find it a very healthy place, for it teems with life, of both the animal and vegetable kingdoms, and all goes well with them. Suddenly, however, the water seems to become poisoned, and the fish are affected to such an extent, that they either die or are stupefied. There are three reasons for this :—

- “1. The periodical rainy season high up on the watersheds of the country around Windhuk.
- “2. The abnormally high tides at the time of the equinoxes.
- “3. The sudden and irregular disturbances of the bed of the bay caused by the setting free of accumulated gases.

“Taking the above in sequence, I will recount my observations.

“Every year, at about December, January or February, I have noticed that the water turns to a deep muddy red colour and then to a deeper brown. This is not so, however, all over the bay, but seems to be in streams of considerable breadth. This is caused by the underground flow of the Swakop River and perhaps that of the Kuisip. The water coming from a higher level forces the ground water out before it, with the result that the water which impregnates the mud at the bottom of the bay is, with all its poisonous qualities, driven out and set in motion by the currents of the bay. It follows naturally that pressure from above pushes the ground water out from the lowest depths of the bay's bed to make room for new water. Thus the fish, which live in mud, only are affected and soles, sand sharks, skates, eels and gurnets, hug the sandy beach which is that part of the bottom which is least contaminated. Some of them are thrown up and die, perhaps several cartloads, mostly small fish, the more vigorous being able to withstand the poison. On these occasions there is very little mortality of a wholesale character, and as they occur year after year, it is to be conjectured that very little harm is done on the whole.

“On the 26th of January, 1904, a note was made of the discolouration of the water. This was the day the Kuisip ran into the sea. Strange to say, on the same date in the following year, 1905, it was noted that quantities of soles

were washed up and that the water was discoloured. In the same year, on February 12th, another note of a similar nature was made and the discolouration continued until the 28th and was caused, undoubtedly, by the underground flow of the rivers. In 1907 the water was discoloured from the 11th to the 17th, being on the 15th as black as ink. This was in December. There were very few soles thrown up, but some of the largest I have ever seen were caught during this period.

"The second cause is a biennial one, occurring more or less markedly about March and September every year. We then get abnormally high tides, which overflow the beaches and form lagoons, holding thousands of tons of water, which sinks into the sand, and is replenished every tide for three and sometimes four days, always forcing out the water which has been in contact with the sulphurous mud, to mix with the waters of the bay, and eventually be either precipitated or carried out into the great Atlantic by the currents and churned by the waves until it is harmless.

"In 1905, on March 1st, 2nd and 3rd, it is recorded that large quantities of dead fish were washed up.

"In September, 1913, a few fish were washed up in a suffocating condition; they consisted of a kind of pilchard, the ground fish and a few harders.

"The most serious occurrence is the last, and it is satisfying to know that it occurs very seldom.

"I have observed that in ponds and wells here, bubbles force their way through the sandy bottom and rise to the surface. I suppose that they are formed by some sort of chemical action in the ground water below. If this can go on on a small scale it can also go on on a large one, hence the island described so well by Mr. Waldron. Much of the gas thus emitted would be taken up by affinity by the waters of the bay and poison thousands of the fish which might happen to be in the affected area. Such a disturbance would also displace a lot of mud with the same deadly power. A wave of extraordinary character is also formed which affects the water both above and below, overcoming its inertia for miles and stirring up quantities of mud and slime, to enhance the general destruction of animal life.

"In the year 1897, in the month of October, as near as I can recollect, I was travelling southwards in a little steamer called the *Leutwein*. We steamed through several miles of dead fish, which we encountered about a mile to the south of Pelican Point. Captain Parrow, a well-known man about Cape Town, could verify this, as he was master of the vessel, and we discussed the matter. He might also be able to give you some more information, as he was on this coast for many years and is an observant man.

"In August, in the year 1895, I journeyed on foot up the coast from Walfish Bay to Cape Cross, and saw the remains

of thousands of dead fishes, mostly harders, but some catfish, strewn along the beach high above the normal highwater mark, for miles to the north of the Walfish Bay Settlement. I had landed in Walfish Bay on the 20th July, and there had been no unusual mortality during that time so I came to the conclusion, from the condition of the remains, that they must have been cast up some days earlier in that month. I made notes about the matter at the time. The next time I noticed a similar occurrence was when the island appeared.

"About four years ago, however, enormous quantities of fish of all sorts were washed up on the stretch of beach from about 8 miles north of the Settlement to Rock Bay, about 11 miles north of Swakopmund, that is about 27 miles. Curiously enough, crabs and crayfish were amongst the victims, and I have never seen this happen before. It was estimated at the time that several tons to the mile must have perished.

"There are other occurrences which I do not in any way connect with this kind of wholesale mortality. At one time, on a journey from here to Swakopmund, I came across numbers of inkfish lying dead amongst the seaweed. On another occasion, a number of conger, a fish seldom met with here, lay dead along the western shore of the bay. As only one sort was affected in each case, I thought that there might have been some sort of illness amongst them.

"There was also some time ago great mortality amongst the flamingoes which swarm here; some said that perhaps their food supply had failed, but one gentleman, a paymaster on a man-o'-war, dissected one and found a worm which ate through the fleshy part of the bird, and was thus the cause of its death. I have no opinion myself about the matter, I only noticed that their legs and feet became swollen at the joints and then they soon died. If this mortality was caused by the little worms, which form their food supply, failing them, the occurrence would come under the category of those now being investigated by you.

"I have never noticed any mortality amongst the cormorants.

"I have always eaten of the fish washed up on the beach as long as they have been quite fresh, the soles forming quite a pleasant change to an unavoidably monotonous diet. These fish have never made me or my family ill, and I am looking forward to the next occurrence.

"As regards the different temperatures of the different coloured waters, I can say very little, though it is to be noticed that the deep tint of the water is always accompanied by a rise in its temperature. Normal water here is from 52° to 54°, but on such occasions the temperature rises to 60° and over.

"At the times when the fish are affected, streams of a light coloured green are seen to cross the bay, but whether their

temperature is greater or less than the other water, I cannot say.

“Another thing worthy of remark is the occurrence of dark dirty blue water, which the natives here, who are very observant of natural effects, call ‘fish water.’ Out on the open sea, water of this colour is sought for by the whalers, who call it ‘whale-feed.’ I have seen these leviathans myself rising partially out of their element with open jaws, which have entrapped many dozen of the small pilchard sort, which may be seen avoiding them at every bite, and which inhabit this water.

“At other times of the year there are streams of reddish water pervading the bay, which, after a time, turn into millions of little jellyfish, but this is not the same sort of colour that has been mentioned, neither is their occurrence accompanied by any mortality amongst the fish.”

(b) *Mortality among fish at Walfish Bay, 13th January, 1915.*

The following note appeared in the *Cape Times* of the 27th January, 1915 :—

“Reuter’s correspondent with the Northern Force, writing from Walfish Bay on January 13, says :— We are experiencing a phenomenal occurrence here, in the shape of thousands of soles, cast up on the shores of the Bay, by, it is alleged, a mysterious sort of disruption, of presumably volcanic origin, which annually takes place somewhere within the confines of the harbour any time between the 1st and 15th days of January. Somewhat reminiscent of manna from Heaven, it is a unique sight to observe the shores littered with fish of such universally pronounced delicacy, yet all too unfortunate rarity. Besides the soles, which are alive when caught, and of perfect freshness, many other denizens of the deep are likewise brought ashore at high tide, and include rays, gurnets, harders, sharks, and swarms of smaller fry, mostly in a semi-stupefied state.

“A strong odour of sulphur was distinctly noticeable in the atmosphere during the night preceding the first wash-up on the beach, while the sea itself assumed a particularly greenish tinge in the daytime.

“The men are thoroughly enjoying the novel experience of picking up soles, merely for the asking, and all of good average size, with occasional hefty samples. When the supply on the shore comes to an end—there are many competitors and many half-sackfuls at least represent an individual collection—a raid into the retreating waters is made by men armed with bayonets and a variety of improvised spears, including mess-forks tied to broomsticks, and further heavy supplies are bagged, amid much excusable excitement and good-humoured banter.

"This remarkable 'windfall' lasts for several days, and in spite of our numbers—('ware the censor')—soles figure largely and frequently on the menu of the meanest, and bully-beef is relegated for the present to a back seat.

"The event had been foretold by an inhabitant, fortunate in the possession of agreeable memories of previous upheavals; but I am afraid that confidence in his powers of veracity was a quality sadly lacking among his hearers. He now, however, pursues the even tenour of his way with a pardonable little smile of satisfaction."

Mr. Gale's observations and theories are of great interest in this enquiry, and seem to throw a good deal of light on this strange occurrence at Walfish Bay. In my last Report evidence was given that the killing off of the fish in this locality was due to an accumulation of decaying vegetable (diatomaceous) matter, doubtless Mr. Gale's "black stinking mud." His first explanation of the breaking up of this mass, namely, that it is due to the influx of fresh water from the underground flow of the Swakop and Kuisip Rivers, seems a probable one, and accounts for the fact that in the letter of Mr. and Mrs. Koch, which seems to be the first description of the occurrence, the phenomenon seems to be associated with the occurrence of floods, though the opening sentence places the occurrence before the flood. (I take this occasion to correct a probable error in translation to which my attention has kindly been drawn by Mr. Hammond Tooke, the date 1887 being probably 1882—the mistake being due to the German method of writing the numeral. *Vide* Marine Biological Report No. 2, p. 21.)

Exceptionally high tides are also not unlikely to disturb the accumulated debris, and such a violent disturbance as resulted in the formation of an island in the year 1900 (*Tr. Phil. Soc.*, Vol. XI., p. 185) can most plausibly be accounted for by the sudden release of the accumulating gases in the decaying vegetable and animal matter.

The recurrence of the same extensive mortality among fish at Walfish Bay last year, though narrated with journalistic embellishments and some errors, as, for instance, the annual recurrence between the 1st and 15th of January, affords some addition to the accumulating evidence which may ultimately lead to an explanation of the phenomenon.

3. MORTALITY AMONG FISH AT KNYSNA.

With a view to ascertaining if the occurrence noted at Knysna (*vide* Marine Biological Report No. 2, p. 27) on the 7th February, 1914, was purely local or not, a circular note was sent by the Provincial Secretary to various Magistrates in the Cape Province, describing what had taken place, and requesting that enquiries be made as to whether a similar

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occurrence had taken place in their districts at this time. These districts extend from Namaqualand on the West coast, to Komgha, on the East coast, so that practically the whole coast of the Cape Province was included. The reports are as follows :—

Namaqualand.—A similar occurrence was not observed on the coast of this district at the time, nor has such an occurrence been previously observed.

Clanwilliam.—The Caretaker at Lambert's Bay reports that for a few days in the early part of February the water at the Bay was unusually cold, but that he did not observe any dead fish about as the result of such cold. He remarks, however, that fish have been very scarce since about that time.

Piquetberg.—Enquiries were made at Berg River Mouth, and it was ascertained that no such occurrence was noticed there, nor along the Piquetberg coast, and moreover it was stated that it had not on any previous occasion been noticed by the fishermen in that neighbourhood.

Malmesbury.—Enquiries were made along the coast, but no evidence of anything unusual was obtained.

Cape Town.—Fishermen state that they never experienced a case similar to that described in the waters surrounding this Port or elsewhere, although they state that the water is much colder after a South-East wind has been blowing.

Simon's Town.—Fishermen in this district state that no such occurrence has been observed. A Mr. Ogill, one of the oldest fishermen at Kalk Bay, states that on two occasions within the past six weeks (writing on March 30th, 1914) the water became very cold, although the weather was fine, but no effect was noticed on the fish.

Somerset West.—No inset of cold water and consequent effects on fish have been noted, and such happenings are quite unknown to the oldest inhabitants in this district.

Caledon.—No such occurrence observed on the coast of this district.

Bredasdorp.—No such occurrence has ever been observed.

Swellendam.—Peculiar insets of cold water have on occasion been observed on the coast in this district, but apparently there had been no effect on the fish.

Riversdale.—The occurrence mentioned was similarly observed along the coast at the mouth of the Gouritz River Eastwards. The fish appeared in a dying condition there, and it is considered that the cause must originate rather from the land than the sea. However, no such occurrence was observed by the fishermen at Still Bay, which is situate South (West ?) of Gouritz River Mouth.

Mossel Bay.—The inset of cold water on February 6th and for some days afterwards was experienced at Mossel Bay, as well as at Knysna. It did not affect the fish so much as at

Knysna, as no fish were floating about in a stupefied condition, or, to my knowledge, found dead in pools. The fishermen, however, reported that they could catch very few fish owing to the coldness of the water, and the fish they did catch were quite cold to the touch, their eyes were white and protruding, and even when gutted, the entrails were perfectly cold. As far as my knowledge goes, this is unusual for January and February months, but it often occurs at the change of the season from summer to winter (when probably cold currents come north at the end of the period of the South-East winds), and then fish have been observed floating on the water's surface in a stupefied condition.

George.—None of the fishermen along the coast in this district experienced the peculiar inset of cold water at the time referred to.

Knysna.—The occurrence is a common one and usually happens during the summer months after a strong South-East gale.

Humansdorp.—An occurrence similar to that referred to was observed in this district extending from Storms River Mouth to Kabeljauw's River. Even small sharks were found dead on the shore; this has not been observed before.

Port Elizabeth.—A number of old residents who have been connected with the fishing industry here for the last 30 years have been interviewed, but none could account for or recall an incident such as that described. It is believed, however, that there was a similar occurrence here about 15 years ago. Mr. Walker, the Harbour Engineer, states that quite recently a large number of dead and moribund fish were washed up in the neighbourhood of the Gamtoos River.

Port Alfred.—No trace has been found of a similar occurrence at this or any other time. The Port Coxswain, who has been here many years, states he has never seen dead fish washed up in any numbers within the vicinity of Port Alfred.

East London.—The skippers of the trawlers state that at times they have noticed the inset of cold water, but they do not attribute to this fact that fish are found dead or floating near the surface in a stupefied condition. One of the skippers is of the opinion that the actual cause may have been a vessel laden with creosote and wrecked at Knysna (c.f. Marine Biological Report No. 2, p. 15). The Port Captain points out that this was 10 or 12 years ago, and he cannot think that the water could have been so cold as to stupefy or kill the fish, and can only attribute the cause to some submarine upheaval or shock, and suggests that gun practice by men-o'-war may have had something to do with the occurrence.

Komgha.—No similar occurrence has been reported from this district.

These reports throw considerable light on the occurrence at Knysna, as they show that it was not merely local but
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extended East and West of the district to a distance of about 60 miles. Dead fish were observed from the Gouritz River Eastwards, but not at Still Bay to the Westwards. Cold water was observed further Eastward at Mossel Bay and affected the fish. At Knysna the cold current and dead fish were observed, and in the Humansdorp District a similar occurrence took place. The fact that nothing of the kind was observed in the George District in the centre of these 120 miles of the South coast can be readily accounted for by the fact that there is so little fishing carried on in this district. To the West of the affected area it is also to be noted that in some cases the water was observed to be exceptionally cold, though the fish were not affected (Lambert's Bay, Simon's Town, Swellendam). It may be of interest also, from a practical point of view, to note that in some cases (Lambert's Bay and Mossel Bay) the fishing was poor at the time.

So far as the evidence goes, the temperature of the water seems to have a direct bearing on the fish supply, either by killing off the fish or by causing "poor catches." Theoretically it does not seem probable that a reduced temperature should have such an important effect on fish life in the sea, though the facts seem to indicate it. The following instance of the effect of cold on river fish may afford some further evidence on this particular point.

4. DEATH OF RIVER FISH FROM COLD.

The "Natal Agricultural Journal" of 25th August, 1905, states that numbers of large dead scale fish were observed on the banks of the Buffels River from its source to its junction with the Ingeli River. It was at first suspected to be the result of dynamiting or poisoning by some unsportsmanlike person, and the matter engaged the attention of the police, but the fact that the mortality was confined, with isolated exceptions, to the scale-fish, that it followed closely upon the extreme cold incidental to a recent blizzard, and that the hibernating habits of the barbel (a scaleless fish) might be expected to protect them from the effects of the abnormally low temperature of the water, appeared on fuller reflection to justify the conclusion that the fish were frozen to death. The same thing is said to have occurred in the upper reaches of the Tugela.

5. MORTALITY AMONGST CRAWFISH.

On the 8th October, 1903, information was received that a large number of Crawfish had been washing up on the shores of Robben Island. In reply to enquiries made, the Commissioner (Mr. George Piers) confirmed the report and on the 16th of that month a visit was made to the Island to enquire

further into the matter. On this date no fresh Crawfish could be found, and few of the shells lying about the shore contained any flesh. No doubt many specimens in a fresh state were hidden between the rocks and in the seaweed below high-water mark. From the number of shells seen, however, it was apparent that the mortality amongst the Crawfish had been very heavy. The empty shells, which, with few exceptions, were those of fully grown fish, were very abundant all along the South shores of the Island, and in several places, extending over a distance of about two miles, were found heaped up in masses of from two to three hundreds, at the head of gullies and creeks. Altogether, the number of shells seen would probably exceed 5,000.

From information received from the Commissioner and several of the inhabitants of the Island, it appeared that the washing ashore of the Crawfish commenced in the early part of September, and that about the middle of that month they were to be seen strewn along the beach, in some places being found heaped up to a height of about two feet.

The opinion of several of the officials of the Island was sought as to the reason for the casting up of these Crawfish, but no explanation could be got. In fact, the matter did not appear to have attracted any special attention, as it was alleged by many that it was more or less of a usual annual occurrence. Several of the leper patients, however, who were found fishing, and who, in reply to enquiries, stated that they had been on the Island a great number of years, asserted that the washing ashore of such large numbers of Crawfish had not been known to them before. Some of these men were of opinion that the Crawfish had come into shallow water to shed their old shells, and had been cast ashore by the heavy seas, which prevailed about that time, while others were of opinion that the mortality was due to some disease.

About the 7th March, 1916, it was reported that thousands of dead Crawfish were washed up on portions of the West coast. The sea was said at the time to have a very obnoxious smell and seemed to contain innumerable "small feather-like objects," the water being of a reddish appearance.

Enquiries were at once made by the Provincial Secretary of the Magistrates at the various districts on the West coast—Namaqualand (Port Nolloth), Van Rhynsdorp, Clanwilliam, Piquetberg and Malmesbury.

At Port Nolloth, with the exception of a few dozen Crawfish and some large King Klipfish (*Genypterus capensis*) no dead fish were observed.

The Magistrate, Clanwilliam, stated that on the 11th February a report was made by the Rev. van Heerden that thousands of Crawfish were rotting on the beach at Lambert's Bay, and requested that they should be buried owing to the danger to the public health. The discolouration of the water

he stated is of frequent occurrence. The casting up of the Crawfish in such "countless numbers" he said is attributed locally to the fact that at the time they were casting their shells, and, being in an enfeebled condition, were unable to cling to the seaweed when the sea became so turbulent.

This occurrence at Port Nolloth was not observed in any of the other places of that district. It appears to have been connected with the occurrence of decaying matter (diatoms or noctiluca or both) in the sea-water at a time when the Crawfish were casting their shells. In this connection, it is, however, to be noted that Crawfish may occur in cases of mortality amongst fish generally (*vide* Mr. Gale's Memorandum, p. 28).

III.—OBSERVATIONS ON SOUTH AFRICAN MARINE INVERTEBRATES.

The following observations were made on Marine Invertebrates kept alive in the tanks of the Marine Station at St. James. They are arranged as a series of notes on facts of special interest under the headings of the various groups of Marine animals.

CRUSTACEA.

The most prominent, and, from a practical point of view, the most important crustacean is the Crawfish, which has already received special attention in previous Reports. I may, however, refer briefly to certain objections which have been made locally as to the validity of these recorded observations. These objections are, first, that the water of False Bay where the Marine Station is situated are "foreign" to the Cape Crawfish, and, secondly, that observations in an aquarium are made under abnormal conditions and therefore not reliable.

With regard to the first statement, it is true that crawfish are not so abundant in False Bay as in Table Bay, but they breed there, and, as has recently been shown, are fairly abundant in certain localities. They become much fewer in number and are of a smaller size on the coast to the East of False Bay, but are still fairly abundant at Hermanus, and a few were even found in the much warmer water of Algoa Bay, during the course of the exploratory work of the "Pieter Faure." The crawfish cannot, therefore, be regarded as foreign to the waters of False Bay.

With regard to the second objection, it is true that the conditions of aquarium life are to a certain extent "unnatural," but certain observations have of necessity to be made under such conditions. We have, for instance, only been able to identify the larval stage of the crawfish by observing them actually hatched out from the egg.

At St. James, in False Bay, the water is very free from contamination by fresh water or sewage, and this locality is, in this respect, an ideal site for an aquarium. The various kinds of Cape Fish also are better represented there.

Experiments in the rearing of crayfish, however, might be more suitably carried out in the colder waters in or near Table Bay, where crawfish occur more abundantly, if suitable facilities can be procured.

The Crustacean parasite (*Idothea unguolata*) mentioned in Report No. 2, page 94, as occurring in the mouth cavity of the "John Brown," is of very common occurrence in South Africa, and has been found in Silver-fish, the Hottentot, the Steenje, and even in the Blaasop. It is very common in the Silver-fish, and has been found in about ten per cent.

of the catch of a fishing boat. It does not appear to be strictly a parasite, feeding on the living tissue of the fish, but is merely attached to the floor of the mouth, and probably secures a share of whatever food passes its way. It is, however, not the less fatal to the life of the fish. At the breeding season it produces a great number of eggs, which hatch out in a brood cavity on its ventral surface, so that it is enlarged to three or four times its normal size. The result is that the anterior part of the pharynx of the fish is gradually occluded and the fish dies of suffocation. In a great many cases this has been observed in the "John Brown" and the Hottentots kept in the aquarium. It doubtless also occurs in the case of the Silver-fish, and, if so, may have some considerable economic significance, as this fish is one of the most abundant in the market, and a great many are found on capture to have this crustacean in their mouths.

The parasite in its free swimming state seems first to become attached to the gills of the fish, as small ones are often found in this position, the large mature forms (often one only) being attached to the floor of the mouth, with the head region between the mandibles of the fish. The death of the host which, apparently, so often occurs, would seem to be fatal to the parasite life, unless it may afford a food supply for the young at this particular stage of their development. When mature, however, they seem to adopt the free swimming mode of life at once, as on several occasions when the animal was removed from the mouth of the fish the young on escaping spread throughout the water in a cloud of active larval forms. On one occasion these were placed in the large tank containing fish, which were at once attracted, as they usually are to such a cloud-like mass (the interest and attention of the fish can at any time be aroused by a puff of smoke). Several of the young *Dasjes* immediately made for the larvae, but always pulled up short before touching them. A large *Klip*-fish then caught sight of an isolated one and at once approached it, but, on closer inspection, made off in great haste. (*Klip*-fish have never been found to be infected with the parasite.) The larvae remained swimming about in the water for the remainder of the day, but by next morning had disappeared.

Various kinds of crabs can readily be kept in the tanks. Amongst the most interesting were species of *Dromia* incased in a large mass of a compound ascidian, others with various large and heavy growths of "red bait," barnacles, etc., on the their backs, and doubtless affording an effective protection.

The common species of shore crabs thrive well in captivity, and are usually busy hunting about for food in the crevices of the rocks in the tank. On a large central piece of rock in the tank a number of anemones flourish, many of them brilliantly coloured, and a crab was observed to visit them from time to time; inserting one claw into the interior of the

anemone, it searched about, apparently with the object of securing any food the anemone may have happened to possess. A slight touch is generally sufficient to cause the anemones to withdraw their tentacles, and to close up, but the rough handling in this instance had not the usual result. They remain expanded, and made no attempt either to capture the crab or to contract. The crab passed from one anemone to another, searching diligently and systematically in a manner suggesting that of a bee visiting flowers for honey. It is not impossible that the crab may in some measure at least render the same services to the anemones as the bee does to the flowers. It is likely enough that the claw of the crab, on withdrawal, carries with it some of the mucus, perhaps the acontia and stinging cells, with which the digestive cavity of the anemone is provided, and in doing so transfers the spermatozoa of one anemone to another, and thus effect fertilisation, for the securing of which so many modifications are observed in the case of flowers and insects. In many anemones the body is protected by adhering shells, etc., which afford protection against predaceous fish and other enemies when the animal is closed, in strange contrast to the brilliant and conspicuous colouring of the disc and tentacles of the animal when expanded. A similar contrast exists in many plants, very marked, for instance, in some of the peculiar Crassulaceae of the Karroo in South Africa, with their conspicuous flowers and inconspicuous stems and branches.

The occurrence seems to suggest that the strikingly gaudy colours of the flower-like sea anemones and coelenterates generally, especially of tropical seas, may have some significance analogous to that of the colours of flowering plants, and further it may throw some light on how the habit of some fish and crabs of taking up their abode temporarily or permanently within the anemones may have arisen.

The significance of the brilliant colours of sea anemones has been a subject of some speculation, and various theories have been formed as to their significance. None of them seem, however, quite conclusive, and it must be admitted that the above suggestion, founded on a single observation cannot be accepted as being of much more value than indicating another direction in which attention may be turned in attempting the solution of the problem.

MOLLUSCS.

The *Octopus* is, of course, the most conspicuous representative of this group in an aquarium, and the most fascinating to the observer—perhaps also to the other inhabitants of the tank, for it takes a lively and usually hostile interest in all its fellow captives. In studying the habits of marine animals it is more instructive to note their relation to each other and their behaviour when together than when isolated, and this is especially so of the *Octopus*.

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The behaviour of the Cape Octopus is probably not much different from that of the European, but a few facts may be noted. Its relationship with the common Dog-fish (*Scyllium africanum*) are of special interest. When an *Octopus* is put into the same tank with these fish they usually begin to move about and search diligently by smell, as their eyes are closed during the day. Sooner or later they find the Octopus, and a fierce fight ensues, generally followed by the devouring of the Octopus by the Dog-fish. One of those fish, a female which had laid a large number of eggs at various times and was nearly always hungry, became specially excited when an Octopus was put into the tank. On one occasion a rather large Octopus was seized by this fish, but clung firmly to the glass of the tank by its suckers. Immediately the fish met this contingency by a device which showed that probably it was already familiar with such tactics in its natural habitat. By powerful circular sweeps of its tail it caused its body to rotate rapidly, so that the Octopus was gradually twisted from its hold, which was so secure that some of the suckers were left attached to the glass. On another occasion an Octopus was seized by two Dog-fish at the same time, and, when they felt this mutual resistance both adopted similar tactics, and the remarkable spectacle was witnessed of two large Dog-fish (about 3 feet in length) revolving rapidly, churning up the water and causing great commotion in the tank, neither fish however succeeding in its object, as they happened to revolve in the same direction. The fish then careered through the tank, shaking their prey as a dog does a rat, and one ultimately succeeded in securing it.

It seemed as if the Octopus and Dog-fish could not be kept in the same tank, and it was therefore somewhat surprising to find on one occasion an Octopus—a fairly large one—apparently on the best of terms with the Dog-fish, often resting in the same corner sometimes even in contact. It transpired, however, that they had already had a trial of strength, and that the Dog-fish had got the worst of it, having even had some difficulty in freeing itself from the enveloping arms of the Octopus. This Octopus shortly afterwards mysteriously disappeared.

Of other Cephalopods, *Loligo*, *Sepia* and *Argonanta* are the most prominent. Attempts were made to keep specimens of the last named animal alive, but without success. The shells of *Spirula* are often very abundant on the beach, but they all seem to have drifted about for some considerable time, being frequently covered with barnacles. Mr. Crawford, of Port Elizabeth, informed me that he has sometimes picked them up with pieces of the flesh of the animal adhering, but in several thousands examined I have seen no undoubted trace of this. One of the reasons why the animal is found so rarely may be that it is quickly devoured by sea-birds, which are constantly on the outlook for such tit-bits cast up on the shore. One fairly complete but dead specimen has been found on the shores of Table Bay.

Of South African Gasteropods there is a great variety, and they seem to have the same habits and inter-relationship in nature as the Northern forms. The common rock pool forms are totally different, however, and we find other genera and species replacing the familiar *Littorina*, *Buccinum*, etc., of the European seas. One form may be mentioned (*Bullia digitalis*), which has no exact parallel in Northern waters. It can be kept for a time in captivity, but its habits can best be observed on the seashore. If a sandy beach be visited at or near low tide, numbers of these Molluscs will probably be seen moving over the wet sand in a manner very unlike the slow crawl of a Gasteropod. The shell of the animal is not large (about an inch in length), but the foot when expanded is very broad, thin and almost circular in outline. By means of the undulating movement of this flat foot the animal progresses over the wet sand at a fairly rapid rate (about a foot in ten seconds) in search of what may be left stranded by the retreating tide. It was observed to secure small crustacea in this way, chiefly amphipods. It held them by folding the anterior part of the foot over the posterior, and then inserting its long proboscis between the fold. If this little mollusc is lifted up by the shell, it does not retract the foot in alarm like most Gasteropods, but makes vigorous attempts to remove the offending fingers by scratching them with its small but rather sharp and pointed operculum. The large expanded foot is waved and twisted about in this endeavour, for a considerable time, or it may soon be withdrawn into the shell. This foot is obviously too large for the shell, and it is at once seen that it has been filled in the expanded condition with a comparatively large quantity of water, as, on contraction three jets of water are shot out, one from the posterior part of the foot between two tail-like prolongations, and one on each side of the antero-lateral margin where there are also short feeler-like projections. It is in only a few molluscs (*e.g.*, *Natica*) that it has been shown that water is taken into the foot, and in such cases the water falls off slowly in large drops, while here jets of water are squirted out, sometimes to a distance of several feet, occasionally into the face of the unwary observer. In several cases the quantity of water discharged was found to be sufficient to fill the empty shell after removal of the animal. Sections of the foot showed that there were large spaces between the muscles of the foot, and there was also a slight involution of the epithelium at the openings. The small tail-like terminations of the foot are trailed behind, and are obviously not steering organs, as has been suggested.

A large *Turbo*, which occurs abundantly on the South African coast, may be noted on account of its striking method of progression. The foot, as in some other Gasteropods, is divided longitudinally by a furrow into two halves, and, in creeping over the surface of the glass in the aquarium, these halves are seen to move forward alternately in a sort of

shuffling walk. This Mollusc is also of interest in that a number of embedded Cirripeds almost invariably are found on the outside of the free margin of the shell, the only part visible being the feathery feet of the barnacle, as they protrude from time to time from their minute holes in the substance of the shell.

The *Opisthobranchs* are well represented. *Aplysias* of the crawling type are fairly common, and one which swam slowly and gracefully in the tanks by means of its large wing-like parapodia. An *Akera* is found on brown algae which it resembles so closely that its presence is difficult to detect. *Philine aperta*, a European form, is common, and is found sometimes in quantities in clearing out the large supply tank of the Marine Station, having apparently been brought in as free swimming forms with the water. Unlike many Tectibranchs, this form appears to be eaten by fish. When placed in a tank, in which was a large number of fish, it was eagerly seized and devoured, though when placed in another with smaller fish it was only nibbled at and soon left. Nudi-branches are varied and numerous. One may be mentioned as a striking example of apparent protection by form and colour. It is found on pieces of the large branching Alcyonarian (*Gorgonia flammea*). Its colour is identical with the brilliant red of the coral, and its rhinophora and cerata have a close resemblance to the expanded polyps; it was indeed at first mistaken for an abnormal bulging on the stem of the coral and was only found to be a Nudi-branch (a *Tritonia*) on removal. Its colouring matter may be derived from that of the coral, as this colour here is very stable.

ECHINODERMS.

The most prominent of this group are the large Starfish (*Asterias glacialis*) whose habits seem to be pretty much the same as the European forms. They thrive well in captivity, and generally procure their fair share of food in spite of their slow movements. Once or twice they were observed to have captured young and active Klip-fish, which had taken refuge, or were resting, in crevices of the rocks in their neighbourhood. The starfish had closed up the outlet by an arm, and then proceeded to envelope the fish in the folds of its everted stomach. In order to test whether or not the fish had been disabled before capture, it was on one or two occasions released, by removing the starfish, when it darted off in quite a lively fashion, seemingly none the worse for its experience. Some stories of the intelligence of starfish and sea-urchins are usually received with a smile of incredulity, as this may be. The facts of the occurrence were, however, as stated, and there was nothing to indicate that this intelligent method of cutting off the retreat of the fish was accidental, except the poor esteem in which zoologists and others hold the intellectual attainments of the humble starfish.

It might be supposed that starfish, with their more perfect locomotory, sensory and defensive organs would be more than a match for the anemones in a contest for food. But this is not altogether so. On one occasion a starfish, feeding on a rather large piece of fish, was detached from the rock, and fell still grasping its food near an anemone, which at once fastened on to the piece of fish with its tentacles, and began to draw it towards its mouth. The starfish kept firm hold of the food, endeavouring to envelope it completely in its arms. The tube feet were firmly applied to the piece of fish, and, in endeavouring to get a more secure hold, these organs came in contact with the tentacles of the anemone. When they did so, they were immediately withdrawn, apparently being irritated by the stinging cells of the anemone. One by one the tube feet were thus forced to withdraw. Then the starfish adopted other tactics; it stretched out one arm, and, getting a secure hold of a piece of rock, endeavoured to draw away the food from the anemone. Thereupon ensued a tug-of-war in which the anemone was drawn out to about double its normal length. Meanwhile, however, the tube feet were compelled to release their hold one after the other, until the starfish had only a very insecure grasp of the food, which was ultimately obtained by the anemone and promptly engulfed in its capacious stomach.

A conspicuous and striking form of the Echinoderms (*Goronocephalus verrucosus*) is frequently procured by fishermen on their hooks and is often abundant in the trawl net in False Bay. As a rule it does not live long in captivity, but begins to break up in a few days. This may be due to some injury received in capture, as sometimes specimens live in captivity for a considerable time.

In the contracted condition in which the fishermen see the animal, it forms a cap or crown-like structure, about 6 or 8 inches in diameter, and is known to them as the "Zee-kroon" (Sea-crown). In the completely expanded form, which they sometimes assume, particularly in the early morning, they are most beautiful objects, their numerous long and finely branched tentacles extending in a circle out into the water for about two feet or so, looking like a delicate white lacework.

It was at first supposed that their branched arms might serve the purpose of securing pieces of food at a distance from the animal or guarding it more effectually from other animals. It made no attempt, however, to secure any food placed near or close to it. Some pieces of fish flesh placed on the tentacles in the semi-retracted condition did disappear into the interior of their basket-like meshwork, and were not seen again, but the normal method of procuring food seems to be by spreading these fine branching tentacles over a rock or freely out into the water, thus securing small animal or plant forms of life. At first they are completely extended

even to the minute endings, but after a time these begin to curl in on themselves from the tip, and finally the main arm became curled up, and the whole bent under the flat disc of the animal's body. This is repeated at long intervals by the different arms in succession. No food particles were, however, at any time actually seen to be collected in this way, and no movement of small particles, as for instance, carmine placed on the tentacles, was observed. Fishermen believe that they catch fish by entangling them in the branching arms, but no evidence of this was obtained.

Of the various animals procured from deep (over 400 fathoms) water, very few showed any movement or signs of life. Amongst the fishes, only the eels exhibited a little flicker of vitality. A remarkable Echinoderm, a Holothurian (*Pseudostichopus?*), however, showed fairly active movements when placed in water. The body is elongate (about 250 mm.), gelatinous, and, curiously enough, of a brilliant purple colour. By means of the somewhat slow undulations of the body, the animal was observed to swim slowly about. These movements lasted for some hours, and the animals were transferred to the large tank at the Marine Laboratory, but soon ceased to show any movement or signs of life.

The commonest "Sea-cucumber" is a small form (*Colochirus*) about 4 inches in length, living in shallow rock pools, where the tentacles only may be seen protruding from the sand or crevices of the rocks. It thrives well in captivity, and its peculiar method of feeding, by inserting its branched tentacles into its mouth, and thus securing what may have been caught by these organs, can readily be observed. Another smaller Holothurian is very common in rather deeper water. It is of a brilliant red colour, which may be of the nature of a "warning colour." At any rate, no fish attempted to touch it or its somewhat yellowish tentacles. It lies conspicuously on the exposed surface of a stone or rock, and makes no attempt to cover up the body in sand or shells as the previous form does.

COELENTERATES.

The anemones are conspicuous objects in the tanks of the aquarium, and usually thrive well, a particular one having lived attached to one spot for about five years. Most of the animals in the tank give them a wide berth, and quickly withdraw, if they should happen to touch their stinging tentacles. Some animals, however, are immune from the irritation of these organs. Thus, the crabs and the crawfish are apparently protected by their shell, though the latter are careful not to touch them with their antennules, and, should they happen to do so, quickly withdraw, and spend some time afterwards in stroking the injured limb, between some of the mouth appendages (the third maxillipedes). Other animals, however, with no special protective covering, touch the tentacles of the anemone with impunity. Thus most

fish occasionally attempt to take the food (pieces of fish, etc.) which the anemones secure, but are careful not to touch the tentacles; the Klip-fish, however, which have very small rudimentary scales, affording practically no protection, often find shelter under the overhanging tentacles of the anemone, and small ones may occasionally be seen resting on its disc, with the tentacles lying around or over them. The anemone makes no attempt to capture these Klip-fish though they readily seize and consume dead Klip-fish.

Of the various well-known habits of the sea anemone—method of feeding, movements, etc.—nothing new was observed. The case of one small anemone may be mentioned in which there appeared to be process of a peculiar division. A small transverse fissure was observed on one side of the body just below the tentacles. This became larger, and a few tentacles began to appear along its lower margin, so that the circle of tentacles of the anemone were in a double row on one side as if a process of transverse fission had commenced there. This gap gradually increased in size, till the gastric or gullet region was crossed and a new and functional mouth appeared. It was expected that this might ultimately result in a budding off or strobilisation of the upper part of the anemone, but this did not happen. The process was a very slow one, and has been in progress for more than twelve months; at present the gap appears as a new disc of the anemone, while the original disc, and the side of the tentacular crown cut off by the gap appears as a small clump of tentacles at one side. The process may have been due to an injury or in some way abnormal.

Division of an anemone into two by a vertical partition is not infrequently observed in the aquarium, and appears to be a normal process of increase in some species.

IV.—THE MARINE BIOLOGICAL LABORATORY AT ST. JAMES.

ORIGIN AND HISTORY.

As the biological investigations initiated by the Cape Government in 1896 progressed, it became increasingly apparent that the exploratory work being carried out by the Government trawler, the "Pieter Faure," required to be supplemented by the facilities which could only be afforded by some sort of Marine Laboratory, in which the material collected could be examined and observations made on the living animals. This became all the more necessary as various questions regarding the spawning and other habits of fish were being raised, in connection with trawling operations. Various difficulties, however, cropped up in the provision of funds, and, although certain sums were once or twice provided on the Government estimates, there always appeared some sufficient reason for withholding these, small though they were. In 1898, however, a Select Committee of the Houses of Parliament, appointed to enquire into the grievances of the fishermen with regard to the new trawling operations, recommended, amongst other things, that the proposed Marine Laboratory be built as soon as possible. The sum of £500 was accordingly voted by Parliament for the purpose, on the understanding that the amount be defrayed from the earnings of the Government trawler. This was easily done, and in six months about £2,000 was available from this source. The estimate for building and equipping a Marine Station was £4,500, but it was obviously expedient to make the best use of the £500 available. Accordingly a commencement was made with one tank and a small room, so designed as to form part of the complete scheme. Various difficulties arose, the chief of which was the lack of accommodation, and the inadequacy of the supply of water, which was furnished by a hand-pump worked by a coloured labourer. Urgent representations were made as to the necessity for proceeding with the building, and these were supplemented by complaints as to the unsightly, incomplete structure on one of the finest spots in the Cape Peninsula. In 1900 it was resolved to go on with the building, and the necessary funds were provided by Government. Further progress was then made, and finally, in the year 1902, the laboratory was in working order, and, with the aid of material procured by the Government trawler, some useful investigations were carried out. The chief of these, of immediate practical value, was the acquiring of some knowledge as to the nature of the eggs and young of the commoner kind of food fishes, the lack of which information at one time seriously threatened the success of the Government

trawler, and the private trawlers now beginning to follow up the work. By 1904 the utility of the work was recognised, and a Select Committee appointed in that year to enquire into the operations of the Agricultural Department, including Fisheries, indicated the desirability of continuing the investigations.

The year 1907, owing to financial depression, proved a disastrous one for fishery and marine biological investigations, and indeed for all work not of absolute necessity. It was felt that further exploratory work could now be left to private enterprise, for a time at least. The special work of the "Pieter Faure" was terminated, and there was difficulty in providing funds for the maintenance of the Marine Laboratory.

An arrangement was, however, come to whereby the period of financial difficulties was tided over until such time as the fishery and biological investigations could be resumed.

The dangers which threatened the existence of the institution were, however, not without their compensation in eliciting various expressions of opinion as to the desirability of supporting it. These even took the form of practical proposals for continuing the work independently of Government support. A special interest in the institution was taken by Sir Abe Bailey, and, even when assured of the continuation of the work, he gave a handsome contribution for the construction of three additional tanks for the large tank room.

In the year 1912 the Union Government was in a position to resume in a modified form the fishery and biological investigations, for which the Marine Laboratory was primarily intended, and the building was placed under the administration of the Provincial Council of the Cape Province. Lately the position of the Laboratory has been much strengthened by the assistance of the Municipality of Cape Town, an abundant and constant supply of sea-water being now obtainable at no cost to the institution, an arrangement having been come to whereby the motive power is supplied from the Municipal Electric Works free of charge. The tank room has become an increasing source of attraction for the numerous seaside residents of the locality, and an appeal to the City Council for further exhibition tanks, on this ground, has met with a ready response, £200 being granted for additional tanks.

BIOLOGICAL INVESTIGATIONS.

The results of the biological work carried out, mostly with the aid of the Marine Laboratory and the Government trawler working in conjunction with it, have appeared in various publications, chiefly in the six volumes of "Marine [C.P. 3—1916.]

Investigations in South Africa," and it may be useful, for reference purposes, to mention these under the various groups investigated. It will be noted that the groups have been very unequally worked out, and on some no reports have, as yet, been received. The Fishes, Crustacea, Mollusca and Alcyonaria are amongst those most exhaustively dealt with.

Fishes.

- (1) The Flat Fishes of Cape Colony. By G. A. Boulenger, Mar. In. Vol. i, p. 1, 1902 (1 n.sp.)
- (2) Descriptions of two new Gobiiform Fishes from the Cape of Good Hope. By G. A. Boulenger, Mar. In. Vol. i., p. 8, 1902 (2 n.sp.).
- (3) Descriptions of New Fishes from the Cape of Good Hope. By G. A. Boulenger, Mar. In. Vol. i., p. 10, 1902 (4 n.sp.).
- (4) On a specimen of *Lophotes cepedianus* from the Cape of Good Hope. By G. A. Boulenger, Mar. In. Vol. i., p. 13, 1902.
- (5) Catalogue of Fishes recorded from South Africa. By J. D. F. Gilchrist, Mar. In. Vol. i., p. 97, 1902.
- (6) South African Fishes. By J. D. F. Gilchrist, Mar. In. Vol. ii., p. 101, 1903 (3 n.g. and 4 n.sp.).
- (7) Description of two new Deep-sea Fishes from South Africa. By G. A. Boulenger, Mar. In. Vol. ii., p. 167, 1903 (2 n.sp.).
- (8) The Development of South African Fishes, Part I. By J. D. F. Gilchrist, Mar. In. Vol. ii., p. 181, 1903.
- (9) Description of New South African Fishes. By J. D. F. Gilchrist, Mar. In., Vol. ii., p. 203, 1903 (3 n.g. 4 n.sp.).
- (10) Description of New South African Fishes. By J. D. F. Gilchrist. Mar. in., vol. iii., p. 1, 1904 (1 n.g., 17 n.sp.).
- (11) The Development of South African Fishes, Part II. By J. D. F. Gilchrist, Mar. In. Vol. iii., p. 131, 1904.
- (12) Description of Fifteen New South African Fishes, with Notes on other Species. By J. D. F. Gilchrist. Mar. In. Vol. iv., p. 143, 1904 (3 n.g., 11 n.sp., 1 n.v.).
- (13) *Areosoma* sp. By G. A. Boulenger, C.R.Ac.Sc. (Paris). 1903.
- (14) The *Bleniidae* of South Africa. By J. D. F. Gilchrist and W. Wardlaw Thompson. Ann. S. Afr. Museum. Vol. vi., p. 97, 1908 (38 sp., 18 n.sp., 1 n.v.).
- (15) Description of Fishes from the Coast of Natal. By J. D. F. Gilchrist and W. Wardlaw Thompson. Part I., Ann. S. Afr. Museum. Vol. vi., 1908 (86 sp., 26 n.sp.).
- (16) Ditto. Part II., Ann. S. Afr. Museum. Vol. vi., 1909 (88 sp., 1 n.g., 9 n.sp.).
- (17) Ditto. Part III., Ann. S. Afr. Museum. Vol. xi., 1911 (37 sp., 5 n.sp.).

- (18) Ditto. Part IV., S. Afr. Museum. Vol. xiii., 1914 (34 sp., 5 n.sp.).
- (19) Revision of the Myeinoids of the Genus *Myxene*. By C. Tate Regan, Ann. Mag. Nat. Hist. (8), xi., 1913. (Includes description of *Myxene capensis*.) 1 n.sp.
- (20) Description of a new Species of Sting Ray from South Africa. By J. D. F. Gilchrist, Tr. Roy. Soc. S. Africa. Vol. iii., Part I., 1913 (1 n.sp.).
- (21) Review of S. African Clupeidae. By J. D. F. Gilchrist, Marine Biological Report, No. 1, 1913 (13 sp., 1 n.sp.).
- (22) Description of New South African Fishes. By J. D. F. Gilchrist, Marine Biological Report, No. II., 1914 (3 n.sp.).

The above papers include descriptions of 11 new genera, 114 new species, 2 new varieties, and additional notes on other species of South African fishes, or fishes recorded from South Africa for the first time. Descriptions of eggs and larvæ of South African fishes are also included.

Hemichordata and Cephalochordata.

- (1) A new species of *Cephalodiscus* (*C. gilchristi*) from the Cape Seas. By W. S. Ridewood. Mar. In., vol. iv. 1909 (1 n.sp.).
- (2) New Forms of the Hemichordata from South Africa. By J. D. F. Gilchrist. Trans. S. Africa Philosophical Society, vol. xviii., p. 12, 1908 (1 ng., 2 n.sp.).
- (3) On Two New Species of *Ptychodera* (*P. proliferans* and *P. natalensis*). By J. D. F. Gilchrist. Ann. S. Afr. Museum, vol. vi., 1908 (2 n.sp.).

These papers include description of a new species of *Cephalodiscus*, three new species of *Ptychodera*, one new genus of the Phoronidea; a new species of *Branchiostoma* is also described in paper No. 6 of the fishes.

Echinoderma.

- (1) On the Echinoderma found off the Coast of South Africa. Part I., Echinoidea. By F. Jeffrey Bell. Mar. In., vol. iii., 1905 (15 sp., 1 n.sp.).
- (2) On the Echinoderma found off the Coast of South Africa. Part II., Asteroidea. Mar. In., vol. iii., 1905 (20 sp.).
- (3) Ditto. Part III., Ophiuroidea. Mar. In., vol. iii., 1905 (11 sp., 2 n.sp.).

Of the 46 species named, only three proved to be new in this group.

Mollusca.

- (1) Description of a new South African Marine Gasteropod. By G. B. Sowerby. Mar. In., vol. i., p. 5, 1895 (1 n.g.).
 - (2) Mollusca of South Africa. By G. B. Sowerby. Mar. In., vol. ii., p. 93, 1902 (16 sp., 6 n.sp.).
 - (3) Ditto. Mar. In., vol. ii., p. 213, 1902 (62 sp., 25 n.sp.).
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- (4) Mollusca of South Africa (Pelecypoda). By G. B. Sowerby. Mar. In., vol. iv., p. 1, 1904 (38 sp., 33 n.sp.).
- (5) The Opisthobranchiata of South Africa. By R. Bergh. Trans. S. Afr. Phil. Soc., vol. xvii (56 sp., 1 n.g., 39 n.sp.).
- (6) Two new Species of *Marginella* from South Africa. By Lewis I. Shackelford. Ann. S. Afr. Mus., vol. xiii., pt. 3, 1914.

The above papers include descriptions of two new genera and 105 new species.

Annelids.

- (1) Marine Annelids (Polychaeta) of South Africa, Part I. By W. C. McIntosh. Mar. In., vol. iii., p. 17, 1904 (23 sp.).
- (2) Marine Annelids (Polychaeta) of South Africa, Part II. By W. C. McIntosh. Mar. In., vol. iii., p. 57, 1904 (18 sp.).
- (3) The Plankton of the South African Seas. II. Vermes, A. Annelida. By P. T. Cleve. Mar. In., vol. iv., p. 125, 1905 (1 sp.).
- (4) The Arenicolidae of South Africa, including an account of *Arenicola loveni*, Kinberg. By J. H. Ashworth. Ann. S. Afr. Mus., vol. xi., p. 1, 1911.
- (5) An account of *Arenicola loveni*, Kinberg. By J. H. Ashworth. Archiv. für Zoologi. Bd. 7, No. 3, 1910.

Crustacea.

- (1) South African Crustacea, Part I. By T. R. R. Stebbing. Mar. In., vol. i., p. 14, 1902 (16 sp., 1 n.g., 2 n.sp.).
- (2) Ditto. Part II. Mar. In., vol. ii., p. 1, 1904 (37 sp., 2 n.g., 9 n.sp.).
- (3) Giant Ostracoda. By T. R. R. Stebbing. Knowledge, vol. xxiv, p. 100 (2 n.sp.).
- (4) South African Crustacea, Part III. By T. R. R. Stebbing. Mar. In., vol. iv., p. 21, 1905 (34 sp., 2 n.g., 5 n.sp.).
- (5) The Plankton of the South African Seas. By P. T. Cleve. I., Copepoda. Mar. In., vol. iii., p. 177 (27 sp., 6 n.sp.).
- (6) Ditto. III., Halocypridae. Mar. In., vol. iv., p. 129, 1905 (14 sp.).
- (7) Ditto. IV., Cypridinae. Mar. In., vol. iv., p. 133, 1905 (5 sp., 3 n.sp.).
- (8) On a parasitic Copepod from *Cephalodiscus*. By W. T. Calman. Mar. In., vol. v., p. 177, 1908 (1 n.sp.).
- (9) South African Crustacea, Part IV. By T. R. R. Stebbing. Ann. S. Afr. Museum, vol. vi., 1908 (28 sp., 1 n.g., 9 n.sp.).

- (10) General Catalogue of South African Crustacea (Part V. of South African Crustacea for the Marine Investigations in S. Africa). By T. R. R. Stebbing. Ann. S. Afr. Mus., vol. vi., part IV., 1910 (2 n.g., 5 n.sp.).
- (11) The Sympoda (Part VI. of South African Crustacea for the Marine Investigations in South Africa). By T. R. R. Stebbing. Ann. S. Afr. Museum, vol. x., part V., 1912 (9 n.g., 14 n.sp.).
- (12) Contributions to the Crustacean Fauna of South Africa. By K. H. Barnard. Parts I. and II. (Isopoda). Ann. S. Afr. Mus., vol. x., pt. VII. and XI., 1914 (29 sp., 2 n.g., 20 n.sp.).
- (13) South African Crustacea (Part VIII. of S.A. Crustacea for the Marine Investigations in South Africa). By T. R. R. Stebbing. Ann. S. Afr. Museum, vol. xv., Part II., p. 57-104, 1915 (21 sp., 10 n.sp.).
- (14) South African Crustacea (Part VII. of S.A. Crustacea for the Marine Investigations in South Africa). By T. R. R. Stebbing. Ann. S. Afr. Museum, vol. xv., Part I., 1914 (24 sp., 2 n.g., 5 n.sp.).
- (15) Contributions to the Crustacean Fauna of S. Africa. V., The Amphipoda. By K. H. Barnard. Ann. S. Afr. Museum, vol. xv., Part III., 1916 (67 sp., 3 n.g., 31 n.sp.).

The above papers on Crustacea include 302 species, of which there are 115 new species and 33 new genera.

Coelenterata.

- (1) The Alcyonaria and Hydrocarallinæ of the Cape of Good Hope. Part I. By S. J. Hickson. Mar. In., vol. i., p. 67, 1900 (16 sp., 1 n.g., 3 n.sp.).
- (2) South African Corals of the Genus Flabellum, with an Account of their Anatomy and Development. By J. Stanley Gardiner. Mar. In., vol. ii., p. 115, 1902 (2 sp.).
- (3) The Turbinolid Corals of South Africa. By J. Stanley Gardiner. Mar. In., vol. iii., p. 93, 1905 (15 sp., 5 n.sp.).
- (4) The Alcyonaria of the Cape of Good Hope. Part II. By S. J. Hickson. Mar. In., vol. iii., p. 211, 1905. (12 sp., 2 n.g., 4 n.sp.).
- (5) The Alcyonaria of the Cape of Good Hope and Natal. Alcyonacea. By J. Stuart Thomson. Tr. Roy. Soc., Edinburgh, vol. xlvii, part III., 1910 (13 sp., 1 n.g., 6 n.sp.).
- (6) The Alcyonaria of the Cape of Good Hope and Natal. Gorgonacea. By J. Stuart Thomson. Proc. Zool. Soc., 1911 (19 sp., 6 n.sp.).
- (7) The Pennatulaceæ of the Cape of Good Hope and Natal. By J. Stuart Thomson. Mem. and Proc. Manchester Lit. and Phil. Soc., vol. lix, part I. (10 sp., 2 n.sp.).

These papers include 87 species, of which there are 26 new species and 4 new genera.

[C.P. 3—1916.]

Chaetogmatha.

The Plankton of the South African Seas. II., Vermes. B. Chaetogmatha. By P. T. Cleve. Mar. In., vol. iv., p. 126, 1905 (6 sp., 1 n.sp.).

Platyhelminthes.

A new species of Planocera from South Africa. By Lydia Jacobowa. Mar. In., vol. v., p. 145, 1908.

Sponges.

- (1) Description of South African Sponges. Part I. By R. Kirkpatrick. Mar. In., vol. i., p. 219, 1902 (8 sp., 1 n.g., 5 n.sp.).
- (2) Description of South African Sponges. Part II. By R. Kirkpatrick. Mar. In., vol. ii., p. 171, 1903 (6 sp., 3 n.g., 3 n.sp.).
- (3) Description of South African Sponges. Part III. By R. Kirkpatrick. Mar. In., vol. iii., p. 203, 1903 (36 sp., 1 n.g., 18 n.sp., 2 n.v.).
- (4) Note on the occurrence of the Euplectellid Sponge, *Regadrella phoenix*, off the South African Coast. By R. Kirkpatrick. Ann. S. Afr. Mus., vol. xiii., Pt. II., 1913.

The above papers include 50 species, of which there are 5 new genera, 26 new species and 2 new varieties.

Protozoa.

On the Genus Botellina, with a description of a new species. By F. Gordon Pearcey. Mar. In., vol. v., p. 185, 1908.

Physical Observations, etc.

- (1) Observations on the Temperature and Salinity of the Sea around the Cape Peninsula. By J. D. F. Gilchrist. Mar. In., vol. i., p. 181, 1902.
- (2) Currents on the South African Coast as indicated by the course of Drift Bottles. By J. D. F. Gilchrist. Mar. In., vol. ii., p. 155, 1904.
- (3) Les Concrétions phosphatées de l'Agulhas Bank. Par Dr. Leon W. Collet, avec une note sur le Glaucosine qu'elles contiennent. Par Galviel W. Lee, B.Sc., Proc. Roy. Soc., Edinb., Session 1904-1905, vol. xxv., Part X.

EDUCATIONAL AND POPULAR ASPECT OF MARINE
BIOLOGICAL LABORATORY.

This side of the work of the Station is one that has not been developed to any great extent, owing chiefly to the lack of funds. The limited facilities at our disposal for this purpose have, however, been fully taken advantage of, and the results indicate that, with proper equipment and

accommodation, the Station could become a great source of attraction for the residents of the Cape Peninsula, and more especially the visitors from the North, who come down in such numbers to the sea, and to whom the living fish, octopus and other marine animals are a never-failing attraction. During the year 1915 there were over forty-eight thousand visitors, the maximum for one month (January) being over eight thousand, as indicated on the registering turnstile of the tank room. Parties of school children and teachers from the schools of the Peninsula occasionally visit the Aquarium, and students of Zoology (now over 100 in number) attending the South African College have an opportunity of seeing the animals they study, in the living condition. All the large Universities of Europe and America have connected with them, directly or indirectly, Marine Laboratories, where zoological studies and research can be carried out, and practical acquaintance made with the various forms of marine life in their natural element.

The detailed number of visitors, including students, scholars, teachers, and the general public for the last three years is as follows:—

	1913.	1914.	1915.
January	8,177	7,939	8,848
February	4,605	4,199	4,306
March	5,925	4,444	5,286
April	3,601	5,774	7,813
May	4,393	3,076	3,456
June	1,184	2,298	1,975
July	1,011	3,539	2,409
August	1,416	2,002	1,152
September	2,600	2,024	1,878
October	3,414	4,015	4,175
November	3,432	3,720	3,650
December	4,418	3,901	4,001
	<hr/> 44,176	<hr/> 46,931	<hr/> 48,949

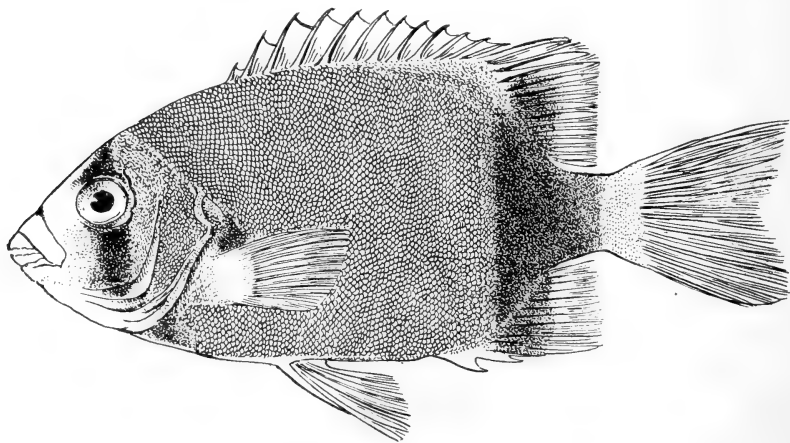
These figures are sufficient to indicate the popularity of the Aquarium, and more than justify any expenditure of money for the purpose of developing this side of the institution. So far only £300 has been given for this specific purpose—the donation of Sir Abe Bailey of £100 and of the City Council of £200. It is the only institution of its kind in South Africa, and no assistance is derived from public or private sources, with the exception of the sums above mentioned to develop or carry on the popular and educational side of the work, for which there is so clearly a demand and a promise of increasing usefulness, as shown by the above figures.

V.—DESCRIPTION OF FOUR NEW S. AFRICAN FISHES.

BY J. D. F. GILCHRIST, D.SC. AND W. WARDLAW THOMPSON,
F.Z.S., F.L.S.

FAMILY **HOPLEGNATHIDAE.****Hoplegnathus algoensis**, n. sp.

Depth of body $2\frac{1}{3}$ times in total length excluding caudal, length of head $3\frac{1}{2}$ times. Body deep, strongly compressed and covered with very small ctenoid scales; head moderately deep, upper profile oblique; snout projecting, $3\frac{1}{7}$ times in length of head; eye rather high, $3\frac{1}{2}$ times in length of head, $\frac{9}{16}$ length of snout; interorbital width 3 times in length of head, strongly convex, scaleless; maxillary reaching vertical of posterior nostril; mouth small, upper lip moderately thick; preopercular border finely serrated, more coarsely so at the angle which is rounded; cheeks and opercles covered with scales; opercle with 2 flat spines enclosing a semi-circular notch; shoulder girdle serrated. Gill-rakers moderately long, 16 on lower part of anterior arch; gill-opening moderately long, membrane free from the isthmus.



Hoplegnathus algoensis, n.sp.

Dorsal xii 14; spines strong, 6th and 7th longest and nearly $\frac{1}{2}$ length of head, membranes deeply incised; soft dorsal high, rounded in front, anterior rays $\frac{2}{3}$ length of head, the remainder shortening progressively and forming an almost vertical slightly emarginate margin to the fin. Anal iii 11, 3rd spine as long as longest dorsal spine; soft portion of fin similar to soft dorsal. Pectoral deep and rounded, $\frac{4}{5}$ length of head. Venal as long

as pectoral, reaching nearly to origin of anal, the spine about $\frac{1}{2}$ length of head. Caudal deep, emarginate, nearly $\frac{9}{10}$ length of head, lobes slightly rounded; caudal peduncle depressed, its length $1\frac{1}{2}$ times in length of head, $1\frac{1}{2}$ times as long as deep. Scales minute, 98 (circa) $\frac{26}{8}$ (circa), lateral line 77; base of soft dorsal and anal and lower $\frac{3}{4}$ of caudal scaled.

Colour (of preserved specimen) pale flesh-colour, covered with minute dark specks; an irregular dark curved band from occiput passing through the eye, broad on the cheek and curving backwards and downwards to the isthmus where it meets the band from the other side; a dark spot above axil, behind the opercular notch; a broad dark band on posterior portion of body and across caudal peduncle, continuing as a dark line on outer edge of caudal lobes, passing as a dark band downwards through anal fin and upwards on to soft dorsal; distal extremity of ventrals dark; a dark smudge on snout and one on chin.

1 specimen, 115 mm. in length, from Algoa Bay. Port Elizabeth Museum.

FAMILY **BLENNIIDAE.**

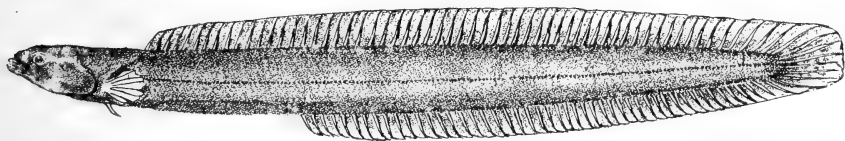
Porogrammus, n.g.

Body compressed, elongate, covered with small scales; teeth in a narrow band on jaws and vomer; 3 distinct lateral lines, with large open pores in close proximity; dorsal and anal fins moderately high, joined by membrane to the caudal fin; pectorals well-developed; ventrals short, jugular. Gill-openings continued forward below; gill-membranes united, not attached to isthmus.

This genus closely resembles *Ernogrammus*, Jord. & Everm., differing mainly in the elongate form of body and the shape of the head and lips, the dorsal and anal fins have a greater number of spines in each and are confluent with the caudal fin, and the branches from the pores to the lateral lines are very short and not exposed.

Porogrammus capensis, n.sp.

Teeth, a narrow band of strong pointed teeth on each jaw, a band on vomer. Depth of body $9\frac{1}{2}$ to $12\frac{3}{4}$ times in total length excluding caudal, length of head $5\frac{1}{5}$ (young) to $8\frac{1}{2}$ times.



Porogrammus capensis, n.sp.

Body compressed, elongate, about the same depth for the greater part of its length. Head somewhat rounded on top,
[C.P. 3—1916.]

with thick rather protruding lips ; snout obtusely pointed, 4 to $4\frac{1}{2}$ times in length of head, eye $3\frac{2}{3}$ to $4\frac{2}{3}$ times, interorbital width 5 to 6 times, cleft of mouth slightly oblique, maxillary reaching vertical of anterior third of eye ; a short tube on nostril. Gill-membranes united below the throat, not attached to isthmus ; gill-openings extending forward making a semi-circular fold across the isthmus ; gill-rakers slender, 7 or 8 on lower part of anterior arch. A row of open pores round orbits and on preopercular border, the latter joining up with upper and median lateral lines.

Dorsal 60 ; spines weak, low in front and rising successively to about middle of fin, the remaining spines subequal and about $\frac{1}{2}$ length of head ; both dorsal and anal fins reach to the caudal, to which they are joined. Pectoral rounded, about $\frac{1}{2}$ length of head. Ventral jugular, short, $\frac{1}{4}$ to $\frac{1}{3}$ length of head. Anal 48, similar to dorsal but not quite so high. Caudal rounded, middle rays longest, $\frac{1}{2}$ to $\frac{3}{4}$ length of head. Body covered with cycloid scales. 3 lateral lines, each with numerous open pores at regular intervals ; those of the upper lateral line being with one or two exceptions on its lower margin ; on the median line the pores are more numerous below than above, on the lowest the pores are all above. The median lateral line extends from base of caudal to border of opercle, thence a short branch passes upwards to nape and joins the upper line which runs from occiput to origin of dorsal fin, where it divides and passes along the base of the fin on each side to the caudal peduncle ; the 3rd line originates at the lower edge of the gill-opening in front of ventrals, dividing below the extremity of the pectoral fin into 2 branches which then form a loop and unite again at origin of anal passing backwards along the base of the fin on each side.

Colour (of preserved specimens) uniform dark brown, with dark spots on membranes of caudal rays forming transverse rows, and on posterior portion of dorsal fin ; or uniform yellowish-brown without spots.

1 specimen, 102 mm. in length, from Miller's Point, Simons Bay.

2 specimens, 38 mm. 68 mm. in length respectively, from St. James, False Bay.

FAMILY LOPHIIDAE.

Halieutichthys fitzsimonsi, n.sp.

Disk sub-circular, slightly wider than long, its length about $\frac{3}{5}$ that of the body excluding caudal. Body covered with stout conical spines, largest upon the disk and most abundant on the cranial portion, those on the trunk arranged in a regular row near the margin, a circular row round the gill-openings and others scattered irregularly over body and tail ; 2 or 3 smaller spines on upper posterior border of caudal peduncle.

A single series of stout 3-pointed spines on outer margin of disk. Short, fleshy, irregular filaments occur near most of the spines ; ridge over rostral cavity armed in front with 3 strong, simple spines ; six strong, simple spines on each supraorbital margin, the anterior of which is immediately above and behind the cavity containing the nostrils. Body smooth below, with the exception of a row of more or less partially developed spines



Halieutichthys fitzsimonsi, n.sp.

along the outer margin, within the marginal row of 3-pointed ones ; this inner row only extends backwards as far as in line with base of ventral fins. Snout short, obtuse ; supraoral cavity elliptical, small, horizontal diameter $\frac{3}{5}$ that of orbit, containing a well-developed club-shaped tentacle with a 3-lobed tip and having a small subsidiary tentacle on the upper side of its base ; width of anterior nostril $\frac{3}{4}$ that of posterior, nostrils not tubular ; width of mouth twice the interorbital space and 3 times vertical diameter of orbits, lower jaw semi-circular and distinctly overlapped by upper ; mouth terminal. Diameter of eyes $11\frac{1}{4}$ times in distance from point of snout to

base of caudal, $8\frac{2}{3}$ times to origin of soft dorsal, $8\frac{3}{5}$ times to origin of anal, 4 times to base of ventrals, 6 times to angle between pectorals and trunk, $6\frac{1}{3}$ times to gill-opening, $8\frac{3}{5}$ times in greatest width of disk, $2\frac{3}{5}$ times in greatest width of trunk. Interorbital area deep, concave, width slightly greater than diameter of eye. Teeth fine on jaws and palate. Gills $2\frac{1}{2}$, no gill-rakers; gill-opening situated about midway between eye and base of caudal.

Dorsal i 5, 3rd ray longest, $1\frac{2}{5}$ times diameter of eye. Pectorals with peduncles entirely included in common membrane, with blades far back, horizontal, lying close to trunk, composed of 14 rays, the middle longest and $4\frac{2}{5}$ times in total length excluding caudal. Ventral fins inserted nearly under the middle of the disk, with 5 rays increasing in length posteriorly, the last longest and contained 5 times in the total length excluding caudal and equalling distance between the bases of the fins. Anal rounded or subtruncate, composed of 9 rays, the 2 external rays on each side simple, the others bifid; length of middle ray equals that of the trunk (measured from junction of pectoral to base of caudal) and slightly exceeds the longest pectoral ray.

Colour (of preserved specimen) white below, darker above and with brownish markings or network in more or less irregular longitudinal rows or patches along the sides of the disk; two oval brown spots on the shoulders; posterior to these are two round white spots each with a strong spine in the centre, the spots being surrounded with a dark brown network; each gill-opening is situated in the centre of a whitish oval spot with a similar brown network surrounding it; the trunk has brownish network markings at each end; the distal extremity of dorsal and caudal fins are blackish.

According to Mr. Fitzsimons "the underparts of the fish are coral red in life."

1 specimen, 158 mm. in length, from Algoa Bay. Port Elizabeth Museum.

The fish is named in honour of Mr. Fitzsimons, Curator of the Port Elizabeth Museum, who also procured the other new specimens here mentioned as from this Museum.

FAMILY SILURIDAE.

Galeichthys ocellatus, n.sp.

Premaxillary band of teeth $5\frac{1}{4}$ times as long as broad, broader than the crescentic band of teeth on the palate. Depth of body $5\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{1}{3}$ times. Head a little longer than broad, moderately depressed, feebly striated on occiput and operculum; a long and narrow occipital process, hidden under the skin, in contact with a small interneural shield; snout broad,

slightly rounded, projecting beyond mouth ; eye lateral, oval, $1\frac{3}{5}$ times in length of snout, $5\frac{1}{8}$ times in length of head, $2\frac{1}{2}$ times in interocular width ; barbels rather flattened, maxillary about as long as head, outer mandibular $\frac{7}{10}$ length of head, inner mandibular $\frac{2}{5}$. Gill-rakers short, 11 on lower part of anterior arch.



Galeichthys ocellatus, n.sp.

Dorsal i 7 ; nearly $1\frac{1}{3}$ times as distant from root of caudal as from end of snout, spine $\frac{3}{4}$ length of head, striated, serrated on outer half in front and behind. Adipose dorsal $1\frac{1}{4}$ times as long as rayed dorsal, $2\frac{2}{5}$ times in its distance from the latter. Pectoral spine similar to the dorsal spine but shorter. Anal 13, 10 rays branched. Caudal deeply forked, lobes pointed ; caudal peduncle twice as long as deep.

Colour (of preserved specimen) dark brown above, lighter yellowish brown on sides, white underneath ; the back and sides, top of the head, interocular space and cheeks, covered with numerous, somewhat indistinct light-coloured rings or ocelli, those below dorsal fin much larger than the rest ; the belly covered with minute brown specks ; fins dark ; barbels dark brown above, white beneath.

1 specimen, 182 mm. in length, from Zwartkops River, Algoa Bay. Port Elizabeth Museum.

VI.—HISTORY OF LOCAL NAMES OF SOME SOUTH AFRICAN FISHES.

BY ROMER ROBINSON.

In an interesting paper on the "History of the Local Names of Cape Fishes" was read by Dr. Gilchrist before the South African Philosophical Society, at Cape Town, in November, 1900. In it he attempts to trace back to their origins the many local names of Cape fishes. This, as may be surmised, was by no means an easy task. The local name borne by a fish may be given on the spur of the moment. It may have reference to some passing object or contemporary incident or, again, it may suggest some comparison which is only obvious to the mind of the namer. Under such circumstances the significance of a local name is soon lost; and can only be guessed at by posterity. In other cases the names are borrowed from known fish more or less resembling the South African forms, or are derived from some peculiarity of habit, shape or colour, which is always apparent. Again, the names may denote the habitat of the fish. I do not intend to go through the long list of Cape fishes which own a local name, but only to refer to such as are known in Natal waters, and to those species which occur here, but not in Cape waters. There are comparatively few Cape names in use here. The local fishermen on our coasts have preferred generally to give their own names to such species as they are acquainted with, despite the fact that farther south the same fishes have a well-established local name. Take, for instance, *Sciaena aquila*, which is known throughout the Cape Colony as "kabeljaauw." The latter name comes from Holland, and is there the name of the cod. The early settlers at the Cape thought they saw a resemblance to their well-known home fish, and gave it the same name, although it is an entirely different family. Here we call it "Cape salmon," or "salmon" only—another instance of mistaken identity. The fish is no more a salmon than it is a cod. The writer and a few others have tried for some time to establish the name salmon bass, following the American nomenclature, which has christened a close relation "white sea bass" or "channel bass." It is to be hoped this name will stick to the fish, as it is less misleading than the name "salmon," which is not justified either by the species, the appearance, or the sporting qualities of the fish. The name "Cape salmon" is applied at Port Elizabeth, East London and Knysna to quite a different fish, namely *Elops saurus*, here called the "springer." There is no doubt this fish far better deserves the appellation "salmon" than does *Sciaena aquila*, for it certainly exhibits superior sporting

attributes than does our sluggish "salmon bass." At the same time, it is not one of the *salmonidae*, and the name is misleading. The name "springer" indicates this fish's well-known habit of repeatedly leaping from the water when hooked, and is a good, sound descriptive title.

At Port Elizabeth, East London, and other Cape ports, if you speak of a "springer" you will be understood to be speaking of the river or estuarine mullet, which is very fond of leaping out of the water, especially at night. It has the same characteristic here, but is known by its proper name, "mullet." One has only to go out in a boat at night on a lagoon or on a river near the sea to realise the extraordinary jumping powers of the mullet. They will leap clean over the head of a rower, and at times a 4 or 5-pounder will half-stun the occupant of the boat by striking him a stunning blow on the head as it leaps. In the day-time also, this fish may be seen constantly leaping in the shallows.

There are only a few Natal fishes which are called after species inhabiting other waters. Of these the "snoek" is one. What is called "snoek" here is quite a different species to the Cape snoek (*Thyrsites atun*). Our "snoek" is a small *Cybiium*, and is really of the same tribe as the local "barracouta." The name "snoek" is the Dutch name for the pike—a fresh-water fish, and the early Dutch settlers called the Cape fish "sea snoek," shortened later to simple "snoek." We have no representative of the family "*Thyrsites*" in the Natal waters. Our "snoek" is a heavier and more shapely fish than the Cape fish, and does not occur in large shoals.

The Natal "barracouta" is named presumably after the West Indian fish of that name. Its scientific name is "*Cybiium commersoni*." The Indian barracouta is "*Sphyræna jello*," which occurs also in Natal waters, where it is called "sea pike." Both fishes are rapacious, fierce fellows, with jaws well armed with sharp teeth. The name "barracouta" seems to be common to nearly every tropical country, and is applied to many different species of fishes.

The name "shad" is also one borrowed from European waters, where it is given to a herring. In Natal the name is applied to "*Temnodon saltator*," or, as the latest authorities have it, "*Pomatomus saltatrix*."

There is very little similarity in shape or appearance between our shad and the home shad. In Cape waters, this fish is called "elf" or "elft," but it is also called "shad" at East London. In American waters our shad is known as the "blue-fish" or "skip-jack," and in Queensland it is called "Tailor," owing to its habit of nipping off the tail of other fish when on the hook.

The "smelt" in Natal (*Sillago sihama*) is called after the European smelt, which belongs to quite another species, but the two fish are small, slender specimens, and the appellation is not difficult to understand.

The name "Bream" is fairly accurate, as the sea bream in English waters belongs to the same family.

The greater number of our fishes, however, bear names which are descriptive of the colouring, appearance or habits of their owners, or are merely fancy names. Among the former are the "Blacktail" (*Sargus rondeletii*), so called from the black spot at the base of the tail, (this fish is called the "Dasje" at the Cape); the "Blueskin" (*Dentex*), a fish taken off the coast, named from the blueish tinge its body bears; the "Greyskin" (*Diagramma griseum*), named by the writer from the colour; the "Blackfish" (*Dinoperca*); the "Copper bream" (*Cantharus*), which is not a bream, but is of a coppery tint; the "Sandshark" is so-called from the fact that it is a bottom feeding fish. It has a shark-like shape, but is really a ray. At the Cape it is called the "Fiddle fish" from its shape.

The "Bonnet Skate" (*Aetobatis narinari*) is also a ray. Its name has reference to the cape-like projection of the front part of its head.

The "Musselcracker" or "Musselcrusher" (*Pargus nigripinnis*) is supposed to subsist chiefly on mussels. This trait, however, I cannot vouch for. Most of the specimens whose stomachs I have examined had dined off crabs, crayfish, sea lice, eels, and, in fact, anything but mussels. I am, however, not prepared to say this fish does not eat mussels at times, though, so far as the Natal coast is concerned, if it had to live on the bivalve in question it would starve, mussels having disappeared these last ten or eleven years. The "Rock-salmon" (*Lutianus*) is not of the salmon tribe, but is a fine sporting fish. Its name denotes its fondness for hanging about the piers at Durban. So far as the rocks along the coast are concerned, it seldom occurs in the surf. It is really an estuarine fish.

The "Stonefish" (*Scorpius lithophilus*) is a lover of rocks, and is not found away from them. Hence the name.

The "Tassel Fish" (*Umbrina*) is so called from the short barbule it bears beneath its chin. The name is not a Natal title, but has been borrowed from Queensland.

The "Butter Bream" (*Pimelepterus*) is not related to the breams. It is a blueish fish, and is called the "Bluefish" at East London. The title "butter" is derived from the fact that the fish has rolls of fat inside it and is usually "as fat as butter."

There is nothing musical about the "Concertina Fish" (*Drepane*). It cannot even grunt, but it has a very prehensile mouth, which can be drawn out like a concertina.

On the other hand, the "Grunter" (*Pristipoma*) is a vocal soloist of no mean order in the finny choir. He will grunt you sweetly as any nightingale. In Queensland they call him the "Trumpeter," which sounds better, but is hardly justified.

The "Sandfish" (*Platycephalus*) is what his name denotes—a bottom-dwelling fish, living half buried in the sand. The Queenslanders call him "Flathead," which is likewise descriptive.

The "Slimy" (*Equula*) most certainly deserves his name. He, too, has an extensible mouth like *Drepane*, but his characteristic feature is the slimy mucous with which his body is coated. To handle this fish is a most unpleasant task. The "Tiger" (*Therapon jarbua*), a small fish of sporting qualities, with yellowish longitudinal stripes, the "Silver," a small transparent species, the "Black Bream" and others, all these bear names, the origin of which can easily be traced, but when we come to consider the fancy names we tread more debatable ground. Many of the species taken outside on the fishing boats owe their names to Mr. Alex. Anderson, who may be regarded as the pioneer of deep-sea fishing in our waters. He tells me that when he started this business the men were ignorant of the names of the fishes they caught. Mr. Anderson made it a point never to be at a loss for a name, and whenever a new species turned up he at once christened it. The names he evolved seem to have stuck, and to have become firmly established.

The name "Slinger" (*Chrysophrys puniceus*) arose in this way. These fish are at certain times very numerous, and are frequently captured three and four at a time. The fishermen haul them aboard on such occasions without ceremony, and "sling" them on to the deck. This was quite enough for Mr. Anderson, who promptly called them "slingers."

The "Scotchman" (*Dentex præorbitalis*) was so christened because it was a slippery customer and a hard fighter. If any Caledonian takes exception to the name, he must address Mr. Anderson, not the writer.

The "Soldier" (*Dentex miles*) is a red fish, and got its name before the days of khaki.

The "Englishman" (*Chrysophrys anglicus*), my informant tells me, reminded him of John Bull, being of a bluff profile and a ruddy complexion.

The "Dane" (*Chrysophrys dentatus*) has no significance. It was just the first name that occurred to its sponsor.

In the same way, when Mr. Anderson was called on to look at a strange fish (*Elacate nigra*) he named it, in an inspired moment, "Prodigal Son," and it is still known by that name. I have often heard it named "Portuguese Salmon," and a coloured fisherman once referred to it as a "Portuguese Son." This perversion is a good example of the way names occur. No one who did not know its previous history could possibly account for the last name. The well-known "Seventy-four" (*Dentex undulosus*) Mr. Anderson states was originally named by him, this name travelling to

Cape waters. He says the fish with its blue longitudinal stripes reminded him of an old-fashioned 74-gun frigate, the stripes representing the rows of guns.

A small brown fish (*Holacanthus*) is called the "Old Woman." I asked Mr. Anderson if this was a term of endearment. He said he feared it was just the opposite. The men regarded the fish, which is not edible, as a nuisance. *Lethrinus scoparius*, a common fish outside, is known as the "Scavenger." It is an omnivorous fish, and the fishermen regard it unfavourably by reason of its bait-stealing propensities. Concerning the "Galjoen" Dr. Gilchrist says: "Similarly the name Galleon, applied to a fish in the Dutch East Indies, is stated by Valentyn ('Old and New East Indies') to have been so called because it followed the ships, and was often found about the Galleons." Dr. Gilchrist, however, suggests that the "Galjoen" may have derived its name from its resemblance in shape to the high-built three-decker of the 15th century, called by the Spanish and Dutch "Galjoen" or "Galleon."

The "Brusher" (*Sargus durbanensis*) is a fish that the writer christened. The manner in which this name was arrived at may as well be set out here in order that future ichthyological students may be saved much brain wracking in their efforts to trace the origin of so peculiar a title. The facts are these. When this fish first made its appearance among anglers in Durban, some said it was a "Bream," others a "Musselcrusher," while others contended it was a hybrid between the two. At that time the fish had no local name, nor did anyone know its scientific name. In order, however, to provide it with a title the writer made up a composite name, viz., the first two letters of the word bream and the last five of the name musselcrusher—hence "Brusher."

The name "Kingfish," which is applied here to *Caranx*, is a name which occurs in every country where anglers go in for salt water fishing. It is a titular tribute to the strength and sporting attributes of a game fish. The "Surgeon" (*Acanthurus*) owes its name to the two sharp lancet-like spines which lie on either side of its tail base.

"Queenfish," like "Kingfish," is a name of universal application, though in nearly every country it is applied to a different fish. Here the name denotes *Chorinemus*, a fine sporting species.

"Moonfish" is the name by which we know *Trachynotus russellii*. Why or how this name was bestowed is not known, but it is possible the soft silvery sheen of its skin when alive may have suggested the silvery beams of fair Luna, or perhaps the lunate sweep of this fish's tail may have recalled the crescent moon to the namer. There is perhaps a somewhat poetical aspect about this surmise, and poets are not often fishermen, but it is quite possible. In the same way the name "Daggerhead," applied locally to *Pagrus pugiliceps* is, according to Dr. Gilchrist, rightly spelled

"Dageraad," which means "dawn." Our local pronunciation shows the necessity for the bilingual principle being applied to fishes' names as well as other objects. "Dageraad" is a poetical name, and very likely it was when the East was all gold and crimson that the captor of the first specimen was struck by the similarity of the fish's gorgeous colouring to the burning hues of the approaching day.*

To descend from the sublime to the ridiculous, we may mention the "Toby" (*Tetrodon*). I suppose there is something plump and short and stumpy about the name Toby. Anyhow, in Durban it seems to fall naturally to the *Tetrodon*, which is a slow, heavy little fish which, when captured, inflates itself into a white balloon.

There are two local names which all my investigations have not been able to throw any light upon. These are the "Garrick" (*Lichia amia*) and the "Karanteen" (*Box salpa*). The former is known as the "Leer visch" in Cape waters—a name meaning leather fish, and no doubt derived from the leather-like texture and appearance of the skin. It has been suggested that the name "Garrick" has been adopted from the famous stage player David Garrick—the fish also being a noted "player," but this is somewhat far-fetched. Mr. Anderson tells me that the fish has always borne the name "Garrick" so far as he can recollect. It is probably a perversion of an Indian or Mauritian name. The name "Karanteen" is another puzzle. What it means or whence it is derived no one can tell me. The Cape name for this fish is "Streepje" from its stripes, or "Bamboo Fish," from the bamboo weed in which it lives there. I should imagine "Karanteen" had a Mauritian origin. It may be some one who reads these remarks will be able to give me some information about these two names. I should be much obliged to receive same.

It is worth noting that not a single native name of any fish is current on our coasts. This in itself would indicate that the Natal natives were not fishermen, which is the fact. At one time, however, the "strandloopers" appear to have subsisted almost entirely on a fish and shellfish diet during the years that Chaka terrorised this Province, and the large kitchen middens along the coast bear witness to the enormous consumption of shellfish, at any rate by these folk. There are even now many old native fishermen to be found here and there on our shores who catch fish with primitive tackle. It would be interesting to have a list of the native names (if any) of those species caught by these survivals of the past. Will some native linguist do me the favour of sending a list?

What, however, is more surprising than the lack of native names is the entire absence of Indian names in our fish vocabulary. One would have thought that the Indian netters, who have plied their business at Durban for the last 50 years

* (See however Marine Biological Report, No. 2, p. 101. J.D.F.G.)

perhaps, would have fixed the nomenclature of the species which they were accustomed to catch and vend. In the early days, before 1875, there were few anglers in this Colony, and still fewer persons who knew anything about the names of fish. The supply of fresh fish came almost entirely through the Indians, and one would have imagined that these dusky fishermen would have given their own names to the various species. So far from this being the case, the Indians have always adopted the names given by the European element, unless "Garrick" and "Karanteen" are exceptions.

VII.—CATALOGUE OF FISHES OF THE CAPE PROVINCE.*

By W. WARDLAW THOMPSON, F.L.S., F.Z.S.

SUB-CLASS TELEOSTOMI.

ORDER TELEOSTEI.

SUB-ORDER Malacopterygii.

FAMILY ELOPIDAE.

Elops, Linn.

Elops, Linn. Syst. Nat. ed. xii, i, p. 518, 1766; Günth. Cat. Fish. vii, p. 469, 1868; Bleek. Atlas Ichth. vi, p. 84, 1872; Bouleng. Fish. Bass. Congo, p. 47, 1901, and Freshw. Fish. Africa, i, p. 25, 1909.

Mugilomorus, Lacép. Hist. Nat. Poiss. v, p. 398, 1803.

Elops machnata, Forsk.

(*Springer*, of Natal; *Salmon*, of Algoa Bay).

Argentina machnata, Forsk. Descr. Anim. p. 68, 1775 (Djeddah, Arabia); Gmel. Linn. Syst. Nat. p. 1395, 1793; Lacép. Hist. Nat. Poiss. v, p. 366, 1803 (Arabian Sea).

Elops saurus (non Linnaeus), Russell, Fish. Vizagapatam, ii, p. 63, and *Inagow*, fig. 179, 1803; Cantor, Cat. Malayan Fish., p. 287, 1849; Jerdon, Madras Journ. Lit. Sci., 1851, p. 146; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**Cape Seas**); Günth. (part), Cat. Fish. vii, p. 470, 1868 (**Cape of Good Hope**; Zanzibar; East Africa; Djedda; Pinang; China); Day, Fish. India, p. 649, pl. clxvi, fig. 1, 1878 (Red Sea; East coast Africa, through seas of India to the Malay Archipelago and beyond); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 154 (**S. Africa**), and Mar. Biol. Rept. i, 1913, p. 50, pl. ii (**Algoa Bay**; **East London**; Natal; Delagoa Bay); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 270 (Natal); Bouleng. (part), Freshw. Fish. Africa, i, p. 25, fig. 17, 1909 (Tropical and sub-tropical seas, ascending rivers of tropical and **South Africa**), and iv, p. 152, 1916.

* Continued from page 167 of Marine Biological Report No. 2.

- Elops machnata*, Cuv. Regne Anim. 1817 ; Rüpp. N. W. Fische, p. 80, 1838 (Red Sea) ; Richards. Voy. *Erebus & Terror*, Fish. p. 59, pl. 36, figs. 3-5, 1846, and Ichth. China, p. 311, 1846 (China) ; Schleg. Faun. Japon. Poiss. p. 241, pl. 109, fig. 2, 1850 ; Day, Fish. Malabar, p. 227, 1865 ; Günth. Fish. Zanzibar, p. 121, 1866 ; Jord. & Everm. Fish. Formosa, p. 327, 1902 ; Regan, Ann. & Mag. Nat. Hist. (8) iii, No. 13, 1909, p. 39 (From the **Cape of Good Hope** to China and Japan) ; Bouleng. Freshw. Fish. Africa, iv, p. 152, 1916 (part.).
- Elops purpurascens*, Richards. Ichth. China, p. 311, 1846 (China).
- Elops capensis*, Smith. Ill. Zool. S. Afr. Pisces, pl. 7, 1849 (**Cape of Good Hope**) ; Casteln. Mém. Poiss. Afr. Austr., p. 67, 1861 (Port Natal).

FAMILY CLUPEIDAE.

SUB-FAMILY ENGRAULINAE.

Engraulis, Cuv.

- Stolephorus*, Lacép. Hist. Nat. Poiss. v, p. 381, 1803.
- Engraulis*, Cuv. Règne Anim. ed. i, p. 174, 1817 ; Günth. Cat. Fish. vii, p. 384, 1868.
- Encrasicholus* ; Fleming, British Anim., p. 183, 1828.

Engraulis capensis, Gilchr.

(*Anchovy*).

- Engraulis encrasicholus*, Pappe (not Linnaeus), Synops. Ed. Fish. C. G. Hope, 1st ed., p. 30, No. 39, 1853, and 2nd ed., p. 21, 1866 (**Cape Seas**) ; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**Cape Seas**) ; Casteln. Mém. Poiss. Afr. Austr., p. 68, 1861 (**Cape of Good Hope**).
- Engraulis capensis*, Gilchr. Mar. Biol. Rept. i, 1913, p. 62 (**South Africa**, Atlantic Coast).

Engraulis holodon, Blgr.

- Bouleng. Mar. Inv. S. Africa, 1902, p. 12 (**Zwartkops River, Algoa Bay**) ; Gilchr. Mar. Biol. Rep. i, 1913, p. 61 (**Zwartkops River**).

SUB-FAMILY CLUPEINAE.

Spratelloides, Blkr.

- Spratelloides* et *Clupeoides*, Blkr. Verh. Bat. Gen. xxiv, 1852, p. 29.
- Spratelloides*, Günth. Cat. Fish. vii, p. 464, 1868.
- Stolephorus* (Lacép.) Jord. & Seale, Fish. Samoa, p. 186, 1906.
- Paralosa*, Regan, Ann. Durban Mus. i, pt. 3, 1916, p. 167.

Spratelloides aestuarius, Gilchr.

(Whitebait.)

Gilchr. Mar. Biol. Rep. i, 1913, p. 55 (**Zwartkops River, Algoa Bay**; in tidal rivers, **East London**; **Princess Vlei, Cape Flats**); Regan, Ann. Durban Mus. i, pt. 3, 1916, p. 167 (Natal).

Sardina, Antipa.

Sardina, Antipa, Denkschr. Akad. Wien, lxxiii, 1906, p. 54; Regan, Ann. & Mag. Nat. Hist. Ser. 8, Vol. xviii, 1916, p. 11.

Clupanodon (part.), Lacép. Hist. Nat. Poiss. V, p. 468, 1803; Jord. & Everm. Fish. N. and Mid. Amer. in Bull. U.S. Nat. Mus. xlvii, 1896, p. 423 (nec Jord. & Gilb. 1883).

Sardina sagax, Jenyns.

(Cape Herring or Sardine; Shad.)

Clupea sagax, Jenyns, Zool. Beagle, Fish. p. 134, 1842 (Lima); Günth. Cat. Fish. vii, p. 443, 1868 (San Francisco; Valparaíso; Japan), and *Challenger*, Shore Fishes, p. 25, 1880 (Valparaíso); Delfin, Cat. Peces Chile, p. 39, 1901 (Pacific coast of America; Iquique); Waite, List Fish. in Records Canterbury Mus. N.Z. Vol. i, No. 1, 1907, p. 10; Gilchr. & Thomp. Ann. S. Afr. Mus. vi, 1909, pt. 3, p. 269 (Natal); Gilchr. Mar. Biol. Rep. S. Afr. i, 1913, p. 57, fig. (**False Bay**).

Clupea melanosticta, Schleg. Fauna Japon. Poiss. p. 237, pl. cviii, fig. 3, 1846 (Nagasaki); Kishinouye, Journ. Imp. Fish. Bureau, Tokyo, xiv, 1907, pp. 71 & 94, pl. xvii.

Clupea ocellata, Pappe, Synops. Edib. Fish. C.G. Hope, p. 29, No. 38, 1853, and 2nd ed. p. 20, 1866 (*Shad*; *Sardyn. Cape of Good Hope*); Blkr. Visch. v. d. Kaap, p. 56, name only, 1860 (**Cape of Good Hope**); Casteln. Mém. Poiss. Afr. Austr. p. 67, 1861 (**Cape of Good Hope**).

Clupanodon coeruleus, (Giard, 1854), Jord. & Everm. Fish. N. and Mid. Amer. p. 423, 1896 (Pacific coast from Puget Sound to Magdalena Bay, abundant on Californian coast, spawning in the sea).

Amblygaster melanostictum, Jord. Tan. & Snyder. Cat. Fish. Japan, p. 37, 1913 (Shores of Southern Japan, China and Korea; Otaru; Misaki Sagami).

Sardina ocellata, Regan, Ann. Durban Mus. i, pt. 3, 1916, name only, p. 167 (Natal).

Sardina sagax, Regan, Ann. & Mag. Nat. Hist. (8) xviii, 1916, p. 13, pl. i, fig. 1 (Chile and Peru; Pacific coast of U.S.A. and Lower California; Japan; **South Africa**).

[C.P. 3—1916.]

FAMILY STOMIATIDAE.

SUB-FAMILY GONOSTOMATINAE.

Astronesthes, Rich.

- Astronesthes*, Richards. Ichth. Voy. *Sulphur*, p. 97, 1845 ;
 Günth. Cat. Fish. v, p. 424, 1864.
Phaenodon, Lowe, Proc. Zool. Soc. 1850, p. 250.

Astronesthes boulengeri, Gilchr.

- Gilchr. Mar. Inv. S. Africa, ii, 1904, p. 103, pl. vi (off **Cape Point**, 360 fms. ; off **Buffalo River**, 490 fms.)

Melanonosoma, Gilchr.

- Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 106.

Melanonosoma acutecaudatum, Gilchr.

- Gilchr. t.c.p. 106 (off **Cape Peninsula**, 360 fms.).

Neostomias, Gilchr.

- Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 168.

Neostomias filiferum, Gilchr.

- Gilchr. t.c.p. 168, pl. 1 (off **Cape Point**, 660 fms.).

SUB-FAMILY STERNOPTYCHINAE.

Argyropelacus, Cocco.

- Argyropelacus*, Cocco, Giorn. Sc. Sicil. 1829, fasc. 77, p. 146 ;
 Cuv. & Val. xxii, p. 392, 1849 ; Günth. Cat. Fish. v,
 p. 384, 1864.
Pleurothyris, Lowe, Fish. Madeira, p. 64, 1861.

Argyropelacus olfersi, Cuv.

- Sternoptyx olfersii*, Cuv. Règne Anim., 2nd Ed. ii, p. 316, pl. 13,
 fig. 2, 1829 (Near **Cape of Good Hope**) ; Duben & Koren,
 in Vet. Acad. Handl., 1844, p. 80, tab. 3, fig. 6.
Argyropelacus durvillii, Cuv. & Val. xxii, p. 405, 1849 (Open
 Atlantic).
Argyropelacus olfersii, Cuv. & Val. t.c.p. 408 (a few miles S.E.
 of **Cape of Good Hope**) ; Lowe, Proc. Zool. Soc. 1850,
 p. 247 ; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860
 (**South Africa**) ; Günth. Cat. Fish. v, p. 386, 1864 (Atlantic ;
 Coast of Norway), and Deep Sea Fish *Challenger*, Zool.
 xxii, p. 167, 1887 (off Cape Finisterre) ; Vaillant, Exped.
 Scient. *Travailleur* et *Talisman*, p. 104, 1888 ; Lilljeborg,
 Sveriges Fiskar, iii, 1889 ; Smitt, Scandinavian Fish.

p. 925, fig. 233, 1895; Jord. & Everm. Fish. N. and Mid. Amer., p. 604, 1896 (Open Atlantic; Coast of Norway to Brazil and to **Cape of Good Hope**; occasionally taken in the Gulf Stream from the Grand Banks Southwards); Goode & Bean, Ocean. Ichth. p. 126, 1896 (Atlantic Basin); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 151 (**South Africa**); Regan, Trans. Linn. Soc. Lond. xii, 1908, pt. 3, p. 219 (Atlantic and Indian Oceans); Holt & Byrne, Fisheries, Ireland, Sci. Invest, 1912, i (1913), p. 20 (Irish Atlantic Slope, 380-700 fms.).
Pleurothyris olfersi, Lowe, Fish. Madeira, p. 64, 1861.

FAMILY GONORHYNCHIDAE.

Gonorhynchus, Gronov.

Gonorhynchus, Gronov. Zoophyl., No. 199, 1763; Cuv. & Val. xix, p. 202, 1846; Kner, *Novara*, Fische, p. 342, 1865; Günth. Cat. Fish. vii, p. 373, 1868.
Rhynchana, Richards. Voy. *Erebus & Terror*, Fish. p. 44, 1846.

Gonorhynchus gonorhynchus, Gmel.

(*Needle-fish*; *Naald-visch*.)

Gonorhynchus, Gronov. Zoophyl., No. 199, tab. 10, fig. 2 (bad), 1763.

Cyprinus gonorhynchus, Gmel. Linn. Syst. Nat. i, p. 1422, 1793; Bl. Schn. Syst. Ichth., p. 443, tab. 78, fig. i (copied from Gronov.), 1801; Lacép. Hist. Poiss. v, p. 570, 1803 (**Cape of Good Hope**).

Rhynchana greyi, Richards. Voy. *Erebus & Terror*, Fish., pl. 29, figs. 1-6, 1846.

Gonorhynchus abbreviatus, Schleg, Faun. Japon. Poiss. p. 217, pl. 103, fig. 5, 1846 (Nagasaki); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 47, 1913 (Southern Japan).

Gonorhynchus gronovii, Schleg. t.c.; Cuv. & Val. xix, p. 207, pl. 568, 1846 (**Cape of Good Hope**; The Bourbon); Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**South Africa**).

Gonorhynchus greyi, Cuv. & Val. t.c.p. 212, 1846 (**Cape of Good Hope**); Richards. Voy. *Erebus & Terror*, Fish. p. 44, 1846; Günth. Cat. Fish. vii, p. 373, 1868 (**Cape of Good Hope**; West Australia; South Australia; Melbourne; Port Nichols, New Zealand); Castelnau, Proc. Zool. Soc. Victoria, i, 1872, p. 182; Klunz. Arch. fur Nat. xxxviii, 1872, p. 42, and Sitzb. Akad. Wiss. Wien, lxxx, 1879, i, p. 415; Macleay, Proc. Linn. Soc. N.S. Wales, vi, 1881, p. 255; Johnston, Proc. Royal Soc. Tasmania, 1882 (1883) p. 132, and 1890 (1891), p. 37; Ogilby, Proc. Linn. Soc. N.S. Wales, xxiv, 1899, p. 154; Waite, Rec. Australian Mus. iii, 1900, p. 211; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 153 (**South Africa**);

- Waite, List Fish. New Zealand, p. 11, 1907; Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 2, 1908, p. 200 (off Amatikulu River mouth).
Cobitis gonorhynchus, Gronov. Syst. ed. Gray, p. 41, 1854 (**Cape of Good Hope**).
Gonorhynchus brevis, Kner, Novara, Fische, p. 342, taf. 16, fig. 1, 1865.
Gonorhynchus gonorhynchus, Stead, The Beaked Salmon (Dept. Fish. N.S. Wales) 1908, pp. 1-8, pl. 1 (New South Wales; Lord Howe Island), and in Proc. Linn. Soc. N.S. Wales, xxxii, 1908, p. 744.
Gonorrhynchus greyi, McCulloch, Rec. West. Aust. Mus. i, 1912, pt. 2, p. 78 (Australian Seas; New Zealand; Tasmania; Lord Howe Island; Kermadecs).

SUB-ORDER **Ostariophysi.**

FAMILY **SILURIDAE.**

SUB-FAMILY **BAGRINAE.**

Galeichthys, C. & V.

- Cuv. & Val. Hist. Nat. Poiss, xv, p. 28, 1840; Blkr. Ned. Tijds. Dierk. 1863, p. 90; Günth. Cat. Fish. v, p. 174, 1864; Bouleng. Freshw. Fish. Africa, ii, p. 381, 1911.

Galeichthys ater, Cast.

(*Black Bagger.*)

- Casteln. Mem. Poiss, Afr. Austr., p. 62, 1861 (**Cape Seas**; rare); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 147 (**South Africa**); Bouleng. Freshw. Fish. Africa, ii, p. 382, fig. 296, 1911 (**Cape of Good Hope**).

Galeichthys feliceps, C. & V.

(*Bagger.*)

- Galeichthys feliceps*, Cuv. & Val. xv, p. 29, pl. 424, 1840 (Neighbourhood of **Cape of Good Hope**); Blkr. Visch. v. d. Kaap, pp. 55 & 76, 1860 (**South Africa**); Cast. Mem. Poiss. Afr. Austr. p. 62, 1861 (**Cape Seas**); Günth. Cat. Fish. v, p. 175, 1864 (**Cape of Good Hope**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 146 (**S. Africa**); Regan, Col. Fish in Ann. Natal Gov. Mus. i, pt. 3, 1908, p. 242 (Bird Islds.); Bouleng. Freshw. Fish. Africa, ii, p. 381, fig. 295, 1911 (**Damaraland to Natal**).
Bagrus capensis, Smith, Ill. Zool. S. Afr. Pisces, pl. 8, 1849 (**S. Africa**); Pappe, Synops. Ed. Fish C.G. Hope, p. 29, 1853 and 2nd ed., p. 20, 1866 (**S. Africa**, very common in the Cape market, especially in winter).

Galeichthys ocellatus, Gilch. & Thomp.

- Galeichthys ocellatus*, Gilchr. & Thomp. Mar. Biol. Rept. iii, 1916, p. 61, (Zwartkops River, Algoa Bay).

SUB-ORDER **Apodes.**FAMILY **ANGUILLIDAE.****Anguilla**, Shaw.

Muraena sp., Artedi, Genera, p. 23, 1738.

Anguilla, Shaw, Gen. Zool., iv, p. 15, 1804; (Thunberg) Cuv.

Règne Anim. 1817; Günth. Cat. Fish. viii, p. 23, 1870;

Jord. & Everm. Fish. N. and Mid. America, p. 347, 1896.

Muraena, Bleeker, Atlas Ichth. Mur. p. 1, 1862.

Anguilla australis, Richards.

Anguilla australis, Richards, Proc. Zool. Soc. 1841, p. 22, and Trans. Zool. Soc. iii, 1843, p. 157; M. Weber, Zool. Jahrb. Suppl. xv, i, 1912, p. 593; Bouleng. Freshw. Fish. Afr. iii, p. 9, fig. 6, 1915 (Indian and South Pacific Oceans; entering rivers of East Africa and Natal); Jord. & Seale, Fish. Samoa, p. 192, 1906 (Samoa; New Zealand; East Indies).

Anguilla bicolor, McClell., Calcutta Journ. Nat. Hist. 1845, p. 178, pl. vi, fig. 1; Günth. Cat. Fish. viii, p. 35, 1870 (River Hooghly; Madras; Ceylon; Java).

Muraena macrocephala, Rapp, Jahresh. Ver. Nat. Württemb. iv, 1849, p. 142, pl. ii.

Muraena (*Anguilla*) *virescens*, Peters, Mon. Berl. Ac. 1852, p. 684.

Anguilla amblyodon, Playf. & Günth. Fish. Zanzibar, p. 125, 1866 (Fresh water of Seychelles); Günth. t.c.p. 37, 1870 (Seychelles).

Anguilla virescens, Peters, Reise Mossamb. iv, p. 101, pl. xxiii, fig. 2, 1868; Pfeffer, Thierw. O.-Afr. Fische, p. 71, 1896 (Zanzibar); Günth. Fische Südsee, p. 392, 1910.

Anguilla virescens (part), Günth. Cat. Fish. viii, p. 35, 1870 (Zanzibar; Seychelles).

Anguilla bengalensis, Gray.

Muraena bengalensis, Gray, in Hardw. Ill. Indian Zool., pl. — fig. 5, 1830.

Anguilla mauritiana, Benn. Proc. Comm. Zool. Soc. 1831, p. 128 (Mauritius); Günth. Cat. Fish. viii, p. 25, 1870 (Island of Johanna; Ceylon; Almorah; Amboyna; Philippines; Formosa), Shore Fish. *Challenger*, p. 58, 1880 (Lake Waiheira, Tahiti), and Fische Südsee, p. 389, 1910; Jord. & Everm. Fish. Formosa, in Proc. U.S. Nat. Mus. xxv, 1903, p. 325 (Kotosho); M. Web. Zool. Jahrb. Suppl. xv, i, 1912, p. 582, fig.

Anguilla elphinstonei, Sykes, Trans. Zool. Soc. ii, 1841, p. 337; M. Web. t.c.p. 578, 1912.

- Muraena (Anguilla) labiata*, Peters, Mon. Berl. Ac. 1852, p. 684.
Muraena (Anguilla) macrophthalma, Peters, l.c.
Anguilla johannae, Playf. & Günth. Fish. Zanz., p. 124, fig. 1866 (Island of Johanna, in fresh water).
Anguilla labiata (part), Playf. & Günth. l.c. (Pangani River, East Coast Africa).
Anguilla labiata, Peters, Wieg. Arch. 1855, p. 270, and Reise Mossamb. iv, p. 94, pl. xvii, 1868; Günth. Cat. Fish. viii, p. 26, 1870 (Zanzibar; Port Natal); Vincig. Ann. Mus. Genova, (2) xv, 1895, p. 27; Pfeffer, Thierw. O.-Afr. Fische, p. 71, 1896, and Ost.-Afr. Fische, p. 41, 1893 (Mhonda); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 155 (**S. Africa**).
Anguilla macrophthalma, Peters, t.c.p. 99, pl. xix, 1868; Günth. t.c.p. 28, 1870 (Zambezi).
Anguilla bengalensis, Günth. t.c.p. 27, 1870 (R. Hooghly; Madras; Nilgherries; India), and Proc. Zool. Soc. 1894, p. 91; Bouleng. Proc. Zool. Soc. 1902, ii, p. 224, and Freshwater Fish. Africa, iii, p. 7, fig. 5, 1915 (Indian and S. Pacific Oceans, entering rivers of East and **South Africa**. Tana; Athi River; Zanzibar; Umgeni River; Durban; **Buffalo River, near King William's Town**; Johanna, Comoro Islds.).
? *Anguilla hildebrandti*, Sauvage, Hist. Madagascar, Poiss. p. 499, pl. xlix, fig. 1, 1891.

***Anguilla mossambica*, Peters.**

- Tribranchus anguillaris*, Peters, in J. Müll. Abhl. Ak. Berl. 1844, p. 193 (No definition of the species).
Muraena (Anguilla) mossambica, Peters, Mon. Berl. Ac. 1852, p. 684.
Anguilla celebesensis, Kaup, Cat. Apod. Fish., p. 42, 1856 (Celebes); M. Web. Zool. Jahrb. Suppl. xv, i, 1912, p. 585, figs.
Anguilla delalandii, Kaup, t.c.p. 50, pl. viii, fig. 41, 1856 (**Great Fish River, Cape of Good Hope**); Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**S. Africa**); Günth. Cat. Fish. viii, p. 33, 1870 (**S. Africa**); Sauvage, Hist. Madagascar, Poiss. p. 498, pl. 1, fig. 6, 1891; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 154 (**S. Africa**).
Anguilla capensis, Kaup, Abh. Nat. Ver. Hamb. iv, 2, 1859, p. 18, pl. ii, fig. 2; Casteln. Mem. Poiss. Afr. Austr. p. 73, 1861 (Rivers of **Cape Colony and Kaffraria**).
Anguilla labiata (part), Playf. & Günth. Fish. Zanz. p. 124, fig., 1866 (Pangani River).
Anguilla mossambica, Peters, Reise Mossamb. iv, p. 98, pl. xviii, fig. 1, 1868; Günth. t.c.p. 28, 1870 (River Molumbo, east of the island of Mossambique); M. Web. t.c.p. 590, 1912; Bouleng. Freshw. Fish. Afr. iii, p. 6, 1915 (**Cape**

- Colony**; near **Grahamstown**; **Buffalo River**, near **King William's Town**; Durban; near Pietermaritzburg; Umfulosi, Zululand; Groot Olifants River, Transvaal; Zanzibar; Seychelles).
- Anguilla aneitensis*, Günth. t.c.p. 34, 1870 (Aneiteum), and Shore Fish, *Challenger*, p. 58, 1880 (Lake Waiheira, Tahiti); M. Web. Fische Aru- und Kei-Inseln, p. 22, 1911 (Elat; in salt water).
- Anguilla virescens*, Günth. t.c.p. 35, 1870 (Zanzibar; Seychelles).
- Anguilla megastoma*, Kaup, Cat. Apodal Fish. p. 30, 1856 (Megareva); Jord. & Seale, Fish. Samoa, p. 192, 1906 (Mangareva; Aneiteum; Tahiti; Samoa; Rarotonga; Tubuai; Austral Islds.; Nukahiva, Marquesas Islds.).

Ophichthys, Ahl.

- Ophichthus*, Ahl. Specim. Ichthyol. p. 9, 1789, and De Muraena et Ophichtho, 1789; Jord. & Snyder, Apod. Fish. Japan, in Proc. U.S. Nat. Mus. xxiii, 1901, p. 871.
- Coecula*, Vahl, Skript. Naturh. Selsk., iii, 1794, p. 149.
- Sphagebranchus*, Block, Ichth. ix, p. 88, pl. 419, 1795.
- Ophisurus*, *Poecilcephalus* et *Caecilia*, Lacép. Hist. Poiss. ii, pp. 98, 135, 195, 1800.
- Apteridithys*, Duméril, Ichth. Anal., p. 205, 1806.
- Congrus*, Rafinesque, Caratteri di alcuni nuovi generi, p. 62, 1810.
- Leptognathus*, Swainson, Classn. Nat. Hist. Fish. Amph. Rept. p. 334, 1839.
- Ichthyapus*, Bris. de Barnville, Rev. et Mag. Zool. 1847, p. 219.
- Leptorhynchus*, Smith, Ill. Zool. S. Africa, Pisces, pl. 6, 1849.
- Centrurophis*, *Poecilcephalus*, *Microdonophis*, *Cocculophis*, *Herpetoichthys*, *Brachysomophis*, *Elapsophis*, *Mystriophis*, *Muraenopsis*, *Scytalophis*, *Leptorhinophis*, *Pisoodonophis*, etc., Kaup, Apodal Fish, pp. 2, 5, 6, 7, 9, 10, 11, 13, 14, 17, 1856.
- Crypteropterus*, Kaup, Aale Hamburg, 1859.
- Achirophichthys*, Bleeker, Ned. Tijds. Dierk. ii, 1865.
- Macrodonophis*, *Uranichtiys*, Poey, Repertorio fis.-nat. Cuba, ii, pp. 251, 256, 1867.
- Ophichthys* (corrected spelling), Günth. Cat. Fish. viii, p. 56, 1870; Bleeker and more recent authors.
- Oxyodontichthys*, Poey, Anales Soc. Nat. Hist. Esp. 1880, p. 254.

Ophichthys serpens, Linn.

- Serpens marinus*, Bellon. De Aquat. p. 156, 1553; Salvian. f. 57, 58, 1554; Rondel. p. 409, 1554; Willughby, p. 107, tab. G4, 1686.
- Muraena* sp. No. 4, Artedi, Gen. 24, Synon. 41, 1738.
- Muraena serpens*, Linn. Syst. Nat. ed. x, 1758, i, p. 425.
- [C.P. 3—1916.]

- Ophisurus serpens*, Lacép. Hist. Poiss. ii, p. 198, 1800 (Rome ; Mediterranean) ; Schleg. Faun. Japon. Poiss., p. 264, pl. 115, fig. 1, 1846 ; Richards. Voy. *Erebus & Terror*, p. 106, 1846 ; Costa, Faun. Nap. Pesc. tav. 28 bis, figs. 1 & 2 (skull), 1850 ; Kaup, Apod. Fish. p. 7, 1856 (Naples ; **Cape of Good Hope**) ; Waite, Mem. Austr. Mus. iv, 1899, p. 52 (Port Stephens, Australia).
- Leptorhynchus capensis*, Smith, Ill. Zool. S. Afr. Pisces, pl. 61, 1849 (**Table Bay**) ; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**South Africa**) ; Cast Mem. Poiss, Afr. Austr. p. 73, 1861 (**Cape Town**).
- Ophisurus macrorhynchus*, Blkr. Verh. Bat. Gen. xxv, Muraen. p. 28, 1853 (Japan).
- Muraena acutirostris*, Gronov. Syst. ed. Gray, p. 19, 1854 (America).
- Ophichthys serpens*, Günth. Cat. Fish. viii, p. 65, 1870 (Naples ; Mediterranean ; Atlantic ; Damaraland ; Japan ; Australia) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 154 (**South Africa**).

Ophichthys unicolor, Regan.

- Regan, Ann. Natal Govt. Mus. i, 1908, pt. 3, p. 250, and Col. Fish. 1908, *ibid*, p. 243 (**Bird Islands**).

FAMILY **MURAENIDAE**.

Gymnothorax, Bl.

- Gymnothorax*, Bloch, Ichth. ix, p. 85, 1795 ; Jord. & Snyder, Apodal Fish. Japan, in Proc. U.S. Nat. Mus. xxiii, 1901, p. 879.
- Lycodontis*, *Thaerodontis*, McClelland, Calcutta Journ. Nat. Hist. v, 1844, pp. 173, 174.
- ? *Sidera*, Kaup, Apodal Fish. p. 70, 1856.
- Eurymyctera*, *Polyuranodon*, Kaup, t.c., pp. 72, 96.
- Taeniophis*, Kaup, Aale Hamburg Mus. Nachtrage, 1859, p. 10.
- Priodonophis*, Kaup, Aalenähnliche Fische, Hamburg Mus. 1859, p. 22.
- Neomuraena*, Girard, U.S. Mex. Bound. Survey, Fishes, 1859, p. 76.
- Pseudomuraena*, Johnson, Proc. Zool. Soc. 1860, p. 167.

Gymnothorax flavomarginata, Rüpp.

- ? *Muraenophis grisea*, Lacép. Hist. Poiss. v, pp. 629, 642, 644, 1803 (New Britain ; Amboina).
- ? *Muraena geometrica*, Rüpp. Atlas, p. 118, taf. 30, fig. 1, 1828 (Red Sea).

- Muraena flavomarginata*, Rüpp. Atlas, p. 119, taf. 30, fig. 3, 1828 (Red Sea); Günth. Fish. Zanz. p. 127, 1866 (Zanzibar; Mossambique), Cat. Fish. viii, p. 119, 1870 (Port Natal; Zanzibar; Seychelles; Java; East Indian Archipelago; Norfolk Island), and *Challenger* Shore Fish. p. 61, Name only, 1880 (Reefs at Honolulu); Klunz. Fische Roth. Meer. p. 615, 1871 (Red Sea); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 155 (**South Africa**).
- ? *Muraena bilineata*, Rüpp. N. W. Fische, p. 84, 1838.
- Muraena praterbernon*, Richards. Voy. *Erebus & Terror*, Fish. p. 84, 1846.
- ? *Thyrsoidea grisea*, Kaup, Apod. Fish. p. 92, fig. 95, 1856 (Djedda; Mauritius).
- Muraena batuensis*, Blkr. Nat. Tijds. Ned. Ind. xii, p. 241, 1857 (Batu).
- Muraena javanica*, Blkr. t.c. xix, p. 347, 1859 (Java).
- Gymnothorax javanicus*, Blkr. Atl. Ichth. Muraen. p. 95, pl. 35, fig. 2, 1862.
- Gymnothorax flavomarginatus*, Blkr. l.c. pl. 32, fig. 2 and pl. 34, fig. 3, 1862, and Faun. Madagascar, iv, Poiss. p. 72, 1875; Seale, Fish. S. Pacific, p. 9, 1906 (Society Islands); Jord. & Seale, Fish. Samoa, p. 200, 1906 (Samoa, Hawaii, Apia); Jord. & Rich. Fish. Philip. Islds. p. 240, 1908 (Calayan); Fowler, Proc. Ac. Nat. Sc. Philad. 1912, p. 22 (Padang, Sumatra).
- Muraena flavimarginata*, Day, Fish. India p. 671, 1878 (Red Sea; Seychelles Archipelago; Bourbon; Mauritius and Seas of India to the Malay Archipelago).

Gymnothorax nebulosa, Ahl.

- Seba, Thes. ii, tab. 69, figs. 1 & 17, 1738.
- Muraena nebulosa*, Ahl, de Mur. et Ophichth. p. 5, tab. i, fig. 2, 1789; Günth. Cat. Fish. viii, p. 130, 1870 (Port Natal; Zanzibar; Madagascar; Seychelles; India; Moluccas; Amboina; Macassar; Siam; China Seas; Feejee Islands; Trinity Bay; New Holland), and in *Challenger* Shore Fish. pp. 54, 58, Name only, 1880 (Reefs at Zebu; Tahiti); Day, Fish. Ind. p. 673, pl. clxxii, fig. 2, 1878 (Red Sea; Madagascar; Bourbon; Seychelles Archipelago; through Indian and Pacific Oceans); Pfeffer, Ost-Afrik. Fische, p. 41, 1893 (Bani; Bueno-Riff); Jatzow & Lenz, Fische Ost-Afrik. Madag. & Ald. p. 528, 1898 (Aldabra; Zanzibar); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 155 (**South Africa**); Regan, Trans. Linn. Soc. xii, pt. 3, 1908, p. 220, Name only (Chagos Archipelago; Peros; Seychelles Group; Costivy).
- Muraena ophis*, Rüpp. Atl. Fische, p. 116, taf. 29, fig. 2, 1828; Richards. Voy. *Erebus & Terror*, Fish. p. 93, 1846.

- Echidna variegata*, Forst. Descr. Anim. ed. Licht. p. 181, 1844 ;
Blkr. Atl. Ichth. Mur. p. 80, tab. 24, fig. 2, 1862.
Thaerodontis ophis, McClell. Calcutta Journ. Nat. Hist. v,
p. 217, 1844.
Muraena variegata, Richards. Voy. *Erebus & Terror*, Fish.
p. 94, pl. 47, figs. 11-16, 1846 ; Blkr. Nat. Tijds. Ned.
Ind. iii, p. 295, 1853 (Moluccas), and Verh. Bat. Gen.
xxv, Mur. p. 47, 1853 (Indian Archipelago) ; Peters,
Wieg. Arch. 1855, p. 270.
Poecilophis variegata, Kaup, Apod. Fish. p. 98, tab. 13, fig. 67,
1856 (Indian Ocean ; Chinese Sea ; Coasts of Australia ;
Polynesian Archipelago ; Japan) ; Kner, *Novara* Fische,
p. 381, 1865.

Leptocephalus, Scopoli.

(*Larval form of Conger Eels.*)

- Leptocephalus*, Scopoli, Int. Hist. Nat. p. 453, 1777 ; Günth.
Cat. Fish. viii, p. 319, 1870 ; Jord. & Everm. Fish. N. and
Mid. America, p. 353, 1896.
Oxyurus, Rafinesque, Caratteri di alcuni nuovi generi, p. 19,
1810.
Helmictis, Rafinesque, Indice d'Ittiologia Siciliana, p. 62, 1810.
Helmichthys, Costa, Fauna Napoli, Pesci. 1854.
? *Leptocephalichthys*, Bleeker, Act. Soc. Sci. Ind. Ned. i,
Manado, p. 69, 1856.
? *Diaphanichthys*, Peters, Monatsber. Akad. Wiss. Berlin,
1864, p. 399.

Leptocephalus taenia, Cuv.

- Leptocephalus taenia* (Cuv.) Quoy. & Gaim. Voy. *Uranic* Zool.
p. 248, 1824 ; Lesson, Voy. *Coquille*, Zool. ii, p. 126,
1838 ; Kaup, Apod. Fish. p. 151, fig. 18, 1856 (India ;
Maldives, etc.) ; Blkr. Visch. v. d. Kaap, p. 56, Name
only, 1860 (**South Africa**) ; Günth. Cat. Fish. viii, p. 143,
1870 (**Cape of Good Hope** ; Zanzibar ; South Atlantic).
Leptocephalus marginatus, Kaup, t.c.p. 152, fig. 19 (Atlantic
Ocean ; Pondicherry).
Leptocephalus lineopunctatus, Kaup, t.c.p. 152, fig. 20 (India ;
Atlantic Ocean, &c.).
Leptocephalus capensis, Kaup, t.c.p. 153 (**Cape of Good Hope**) ;
Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 155
(**South Africa**).

Leptocephalus morrisii, Gmel.

(*Larval form of the Conger Eel.*)

- Leptocephalus*, Pennant, British Zool. iii, p. 139, pl. 25 (bad)
1769 ; Gronov. Zoophyl. No. 410, tab. 13, fig. 3 (bad)
1763.

- Leptocephalus morrisii*, Gmel. Syst. Nat. i, p. 1150, 1788 (Holyhead, England); Bl. Schn. Syst. Ichth. p. 133, tab. 108, fig. 2 (very bad) 1801; Montague, Werner. Mem. ii, p. 436, pl. 22, fig. 1; Leach, Zool. Misc. iii, p. 10, pl. 126; Deere, Loud. Mag. Nat. Hist. vi, p. 530; Yarrell, British Fish. 2nd ed., 1841, ii, p. 409 or 3rd ed. 1859, i, p. 40; Peach, Ann. & Mag. Nat. Hist. xiii, 1854, p. 238; Kaup, Apod. Fish. p. 147, 1856 and Ann. & Mag. Nat. Hist. vi, 1860, p. 271; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**South Africa**); Günth. Cat. Fish. viii, p. 139, 1870 (British coast; Southern Europe; Messina; Nice; Madeira; Australia); Herdm. & Daw. Fish. Irish Sea, p. 62, 1902 (Estuaries of Mersey, Dee, Wyre, and in Barrow Channel; called immature stage of *Conger vulgaris*); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 155 (**South Africa**).
- Leptocephalus spalanzani*, Risso (not Ichth. Nice, p. 85) Eur. Mérid. iii, p. 205, 1827; Kaup, Apod. Fish. p. 147, fig. 7, 1856 (Nice).
- Leptocephalus gussoni*, Cocco, Isis, 1831, p. 1340.
- Leptocephalus gracilis*, Storer, Mem. Amer. Acad. ii, 1839, p. 524 (Massachusetts).
- ? *Leptocephalus candidissimus*, Costa, Faun. Nap. Pesc. C. tab. 1850.
- Ophidium pellucidum*, Couch, Loud. Mag. Nat. Hist. v, 1852, pp. 313 & 742 (England).
- Leptocephalus conger*, Jord. & Everm. Fish. N. and Mid. Amer. p. 354, 1896 (Atlantic Ocean, generally on both coasts from Cape Cod to Brazil; also, on coasts of Asia and Africa; almost cosmopolitan, but not found in the Eastern Pacific); Everm. & Marsh, Fish. Porto Rico, in Bull. U.S. Fish. Comm. xx, pt. 1, 1900, p. 70 (Atlantic Ocean, etc.).

SUB-ORDER **Haplomi.**

FAMILY **SCOPELIDAE.**

Bathypterois, Günth.

- Bathypterois*, Günth. Ann. & Mag. Nat. Hist. 1878, (5) ii, p. 183; Jord. & Everm. Fish. N. and Mid. America, p. 544, 1896.
- Synapteretmus*, Goode & Bean, Oceanic Ichthyology p. 64, 1895.

Bathypterois ater, Gilchr.

- Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 167, pl. xlix (off **Cape Point**, 900 fms.).
[C.P. 3—1916.]

Bathypterois filiferus, Gilchr.

Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 166, pl. xlviii (off **Cape Point**, 630-1,000 fms.).

Chlorophthalmus, Bonap.

Chlorophthalmus, Bonap. Faun. Italica. Pesc. fasc. xxviii, 1840; Günth. Cat. Fish. v, p. 403, 1864; Jord. & Everm. Fish. N. and Mid. America, p. 541, 1896.

Hyphalonedrus, Goode, Proc. U.S. Nat. Mus. iii, 1880, p. 483.

Chlorophthalmus gracilis, Günth.

Günth. Ann. & Mag. Nat. Hist. 1878, ii, p. 182, and Deep-sea Fish. *Challenger*, Zool. xxii, 1887, p. 194, pl. xlix, fig. A. (off Eastern coast of New Zealand, 1,100 fms.; middle of S. Atlantic, 1,375 fms.; off Juan Fernandez, 1,425 fms.); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 165 (off **Cape Point**, 755 fms.); Waite, List Fish. New Zealand, p. 13, 1907.

Chlorophthalmus punctatus, Gilchr.

Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 15, pl. xxxv (off **Lion's Head, Cape Peninsula**, 154 fms.).

Ipnops, Günth.

Günth. Ann. & Mag. Nat. Hist. 1878, ii, p. 187; Jord. & Everm. Fish. N. and Mid. America, p. 546, 1896.

Ipnops murrayi, Günth.

Günth. Ann. & Mag. Nat. Hist. 1878, ii, p. 187, and Deep-sea Fishes, *Challenger* Zool. xxii, 1887, p. 191, pl. xlix, fig. B. (Coast of Brazil, 1,600 fms.; Near Tristan d'Acunha, 1,900 fms.; North of Celebes, 2,150 fms.); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 166 (off **Cape Point**, 800-900 fms.)

Scopelus, Cuv.

Myctophum, Rafinesque, Indice d'Ittiologia Siciliana, p. 56, 1810; Jord. & Everm. Fish. N. and Mid. America, p. 569, 1896.

Scopelus, Cuv. Règne Anim. Ed. i, p. 56, 1817; Günth. Cat. Fish. v, p. 404, 1864.

Nyctophus, Cocco, Giorn. Sci. Litt. Art. Sicil. 1829, p. 44 (Emended orthography of *Myctophum*).

Alysia, Lowe, Proc. Zool. Soc. 1839, p. 87, and Trans. Zool. Soc. iii, p. 14.

Neoscopelus, Johnson, Proc. Zool. Soc. 1863, p. 44.

Rhinoscopelus, Lutken, Vid. Selsk. Natur. Copenhagen, vii, 1892, p. 237; Jord. & Everm. Fish. N. and Mid. America, p. 568, 1896.

Scopelus argenteus, Gilchr.

Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 15, pl. xxxvi (Near **Saldanha Bay**).

Scopelus coccoi, Cocco.

Scopelus coccoi, Cocco, in Giorn. Sci. Litt. Art. Sicil. No. 77, 1829, p. 143 (Palermo), and Lett. S. Salmon, p. 18, tab. 2, fig. 6, 1838; Bonap. Faun. Ital. Pesc. C fig. 1841; Günth. Cat. Fish. v, p. 413, 1864 (Mediterranean; Gulf of Guinea; Congo; Atlantic; Tropics); Lutken, Spolia Atlantica, ii, p. 236, 1892; Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 165 (off **Cape Point**; in surface Tow-net).

Alaysia loricata, Lowe, Proc. Zool. Soc. 1839 p. 87 (Madeira), and Trans. Zool. Soc. iii, p. 14.

Myctophum hians, Richards. Voy. *Erebus & Terror*, Ichth. p. 41, pl. 27, figs. 19-21 (eye too large) 1846.

? *Scopelus jagorii*, Peters. Monats. Berlin Akad. 1859, p. 411.

Stenobranchius coccoi, Goode & Bean, Ocean. Ichth. p. 91, 1895.

Rhinoscopelus coccoi, Jord. & Everm. Fish. N. and Mid. Amer., p. 568, 1896 (Western Atlantic, very abundant among the surface fishes of the Gulf Stream, rare in the Mediterranean, and ranging from Newfoundland to Africa); Goode & Bean, Ocean. Ichth. p. 90, 1896 (One of the most abundant of the surface forms in the Western Atlantic).

FAMILY **CYPRINODONTIDAE**.**Fundulus**, Lacép.

Lacép. Hist. Nat. Poiss. v, p. 37, 1803; Günth. Cat. Fish. vi, p. 318, 1866; Bouleng. Fish. Nile, p. 413, 1907, and Freshw. Fish. Africa, iii, p. 23, 1915.

Fundulus capensis, Garman.

Garman, Mém. Mus. Comp. Zool. xix, i, 1895, p. 113; Bouleng. Freshw. Fish. Africa, iii, p. 39, 1915 (**False Bay, Cape of Good Hope**).

SUB-ORDER **Heteromi**.FAMILY **HALOSAURIDAE**.**Halosaurus**, Johnson.

Johnson, Proc. Zool. Soc. 1863, p. 406; Günth. Cat. Fish. vii, p. 482, 1868; Jord. & Everm. Fish. N. and Mid. America, p. 607, 1896.

[C.P. 3—1916.]

Halosaurus affinis, Günth.

Günth. Ann. & Mag. Nat. Hist. 1877, xx, p. 444, and Deep-sea Fish, *Challenger*, Zool. xxii, 1887, p. 241, pl. lix, fig. B (South of Japan, 565 fms.); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 171 (off **Cape Point**, 500-630 fms.); Jord. Tan. & Snyd. Cat. Fish. Japan, p. 40, 1913.

Halosaurus niger, Gilchr.

Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 170, pl. li (off **Cape Point**, 800-930 fms.).

FAMILY **NOTACANTHIDAE**.**Notacanthus**, Bloch.

Notacanthus, Bloch, Ausl. Fische, 1795, xii, p. 114, and in Abhandl. Bömisschen Ges. Wiss. 1787, i, p. 278; Günth. Cat. Fish. iii, p. 544, 1861; Jord. & Everm. Fish. N. and Mid. America, p. 614, 1896.

Acanthonotus, Bloch, Ichth. xii, p. 113, 1797.

Campylodon, Fabricius, Vidensk. Selsk. Skr. Kjöbenh. iv, 1798, p. 22; Reinhardt, Vidensk. Selsk. Afh. p. 120, 1838.

Notacanthus annectens, Blgr.

Bouleng. Mar. Inv. S. Afr. ii, 1904, p. 167, pl. xi (off **Cape Peninsula**, 250 fms.).

SUB-ORDER **Catosteomi**.FAMILY **LAMPRIDAE**.**Lampris**, Retzius.

Lampris, Retzius in Nya Handlung. iii, 1799, p. 91; Cuv. Règne Anim. ed. 1, p. 325, 1817; Günth. Cat. Fish. ii, p. 415, 1860; Jord. & Everm. Fish. N. and Mid. America, p. 954, 1896.

Chrysotosus, Lacép. Hist. Nat. Poiss. iv, p. 586, 1802.

Lampris immaculata, Gilchr.

Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 4, pl. xxii (**Muizenberg, False Bay**).

FAMILY **FISTULARIDAE**.**Fistularia**, Linn.

Selanostomus, Klein, Pisces, Miss. iv, p. 23, 1740 (non-binomial); Gronov. Mus. Ichth. i, p. 11, 1754, and Zoophyl. p. 119, 1763.

Fistularia, Linn. Syst. Nat. Ed. x, p. 312, 1758; Lacép. Hist. Nat. Poiss. v, p. 349, 1803; Günth. Cat. Fish. iii, p. 529, 1861; Jord. & Everm. Fish. N. and Mid. America, p. 756, 1896; Jord. & Starks, Hemibr. Fish. Japan, in Proc. U.S. Nat. Mus. xxvi, 1902, p. 66.

Cannorhynchus, Cantor, Cat. Malayan Fishes, p. 211, 1850.

Flagellaria, Gronov. Syst. ed. Gray, p. 146, 1854.

***Fistularia petimba*, Lacép.**

Pike Fish Conger, Dampier, Voy. New Holland, in Coll. Voy. iii, pl. facing p. 184, 1703.

Fistularia tabaccaria, White, Voy. Botany Bay, p. 296, fig. 2, 1790.

Fistularia tabaccaria var., Bl. Ichth. viii, p. 130, taf. 387, figs. 2 & 3, 1794; Bl. Schn. Syst. Ichth. p. 114, 1801; Russell, Fish. Vizagapatam, ii, p. 58, and *Goorum* pl. 173, 1803.

Fistularia petimba, Lacép. Hist. Nat. Poiss. v, p. 349, 1803, excl. synon. (New Britain; Isle of Réunion; Equatorial Pacific: based on specimens and manuscript of Commerson); Jord. & Everm. Fish. N. and Mid. Amer. p. 758, 1896 (Western Pacific; Bermudas; Cuba); Jord. & Snyder. Jap. Fish. in Proc. U.S. Nat. Mus. xxiii, 1901, p. 350 (Tokyo); Jordan & Starks, Hemibr. Fish. Japan, in Proc. U.S. Nat. Mus. xxvi, 1902, p. 67 (Wakanoura; Misaki; Nagasaki); Jord. & Seale, Fish. Samoa, p. 211, 1906 (Samoa, common throughout South Seas), and Fish. Luzon & Panay, p. 9, 1907 (Cavite); Everm. & Seale, Fish. Philippine Islds. p. 56, 1907 (San Fabian, etc.); Jord. & Rich. Fish. Philippine Archipel. p. 245, 1908 (Cuyo; Lubang); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 103, 1913 (Indian and Pacific Oceans; Japan).

Fistularia immaculata, Cuv. Règne Anim. Ed. i, p. 349, 1817 (Seas of the Indies; after Commerson and John White); Richards, Ichth. China, p. 247, 1846; Schleg. Faun. Japon. Poiss. p. 320, 1850; Jerdon, Madras Journ. Lit. Sci. 1851, p. 140; Blkr. Nat. Tijds. Ned. Ind. iii, 1852, Amboina & Ceram p. 281, and Verhandl. Acad. Wet. Amsterd. i, Japan, p. 11, 1854.

Fistularia serrata, Cuv. Règne Anim. Ed. i, p. 349, 1817 (after Bloch); Günth. Cat. Fish. iii, p. 533, 1861 (Aden; Madras, Bengal, Singapore; Sea of Pinang; Amboina; China; Formosa; New South Wales; Bermuda), and Shore Fish. *Challenger*, p. 68, pl. 32, fig. C, 1880 (Yokohama); Kner, *Novara*, Fische, 1865, p. 238; Playfair, Fish. Zanz. p. 79, 1866 (Aden; Zanzibar; Seychelles); Klunz. Verh. Zool.-bot. Ges. Wien, 1871, p. 515; Day, Fish Ind. p. 360, pl. lxxvi, fig. 3, 1876 (Madras; Andaman Islands; East coast of Africa and through seas of India to the Malay Archipelago, China and New Holland);

- Jord. & Gilbert, Synops. p. 390, 1883; Pfeffer, Ost.-afrik. Fische, p. 17, 1893 (Zanzibar); Jatzow & Lenz. Fische Ost.-afrik. Madag. & Aldab. p. 516, 1898, Name only (Zanzibar); Waite, Mem. Austr. Mus. iv, 1899, p. 58 (Coast of New South Wales); Steindr. Fische Sud-arab. & Sokotra, p. 27, Name only, 1902 (Makalla); Jord. & Everm. Fish. Formosa, p. 330, 1903 (Formosa), and Bull. U.S. Fish. Comm. xxiii, pt. 1, 1903 (1905), p. 116 (Honolulu); Jord. & Seale, Fish. Samoa, p. 211, 1906 (Hawaii; New Guinea; East Indies; Japan), and Fish. Luzon & Panay, p. 9, 1907 (Cavite); Everm. & Seale, Fish. Philippine Islds. p. 57, 1907 (Bacon); Jord. & Rich. Fish. Philip. Archip. p. 245, 1908 (Manila); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 257 (Natal); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 103, 1913 (Hawaii; New Guinea; East Indies; Japan); Seale, Fish. Hongkong, p. 62, 1914; Bamber, Journ. Linnean Soc., vol. xxxi, 1915, Zool. No. 210, p. 479 (Western shore of Red Sea, between Suez and Suakim).
- Fistularia commersonii*, Rüpp. N.W. Fische, p. 142, 1834 (Red Sea); Peters, in Wieg. Arch. 1855, p. 258.
- Cannorhynchus immaculatus*, Cantor, Malay. Fish. p. 211, 1849 (Sea of Pinang).
- Cannorhynchus serratus*, Blkr. Versl. Akad. Amst. (2) vii, 1873, Arou, p. 3 and Fish. Madagascar, p. 74, 1875.
- Skeleton, Rosenth. Ichthyot. Taf. ix, figs. 8-12 (*Fistularia tabaccaria*), 1849.

FAMILY MACRORHAMPHOSIDAE.

Macrorhamphosus, Lacép.

- Macrorhamphosus*, Lacép. Hist. Poiss. v, p. 136, 1803; Jord. & Everm. Fish. N. and Mid. America, p. 759, 1896; Regan, Ann. & Mag. Nat. Hist., series 8, xiii, 1914, p. 18.
- Centriscus* (non Linnaeus) Cuv. Règne Anim. 1st ed. ii, p. 350, 1817; Günth. Cat. Fish. iii, p. 518, 1861.
- Macrogathus*, Gronov. Syst. ed. Gray, p. 147, 1854.
- Ortichthys*, Gill, Proc. Acad. Nat. Sc. Philad. 1862, p. 234.

Macrorhamphosus scolopax, Linn.

(*Snipe-fish*; *Trumpet-fish*; *Bellows-fish*.)

- Scolopax*, Rondel., De Pisc. xv, cap. 5, p. 422, 1554; Aldrov. iii, c. 13, p. 298, 1638; Johnston, i, tit. 1, cap. i, art. 4, tab. 1, fig. 9, 1649.
- Trumpet-fish*, Willughby, p. 160, tab. 125, fig. 2, 1686; Ray, Synops. p. 50, 1713; Couch, Linn. Trans. xiv, p. 89.
- Solenostomus* No. 1, Klein, Pisces, Miss. iv, p. 24, 1749.
- Centriscus* sp., Gronov. Zoophyl. No. 395, 1763.

Centriscus scolopax, Linn. Syst. Nat. ed. xii, i, p. 415, 1766 ; Brünn. Pisc. Massil. p. 8, 1768 ; Bl. Ichth. i, p. 55, taf. 123, fig. 1, 1797 ; Lacép. Hist. Poiss. ii, p. 95, pl. 19, fig. 3, 1800 (Rome) ; Bl. Schn. Syst. Ichth. p. 112, 1801 ; Shaw, Nat. Misc. xiv, pl. 584, and Gen. Zool. v, p. 459, pl. 181, 1803 ; Turton, British Faun. p. 117, 1807 ; Donovan, British Fish. iii, pl. 63, 1808 ; Cuv. Règne Anim. 1817 ; Fleming, British An. p. 220, 1828 ; Martens, Reise n. Venedig, ii, p. 436, 1824 ; Jenyns, Man. p. 400, 1835 ; Guérin. Iconogr. Poiss. pl. 45, fig. 2, 1844 ; Yarrell, British. Fish. ed. 1, 1836, p. 302 ; ed. 2, 1841, i, p. 346 ; ed. 3, 1859, ii, p. 190 ; Gronov. Syst. ed. Gray, p. 138, 1854 (Mediterranean) ; Blkr. Visch. v. d. Kaap, p. 55, Name only, 1860 (**S. Africa**) ; Günth. Cat. Fish. iii, p. 518, 1861 (Adriatic ; Mediterranean) ; Jord. & Gilbert, Synops. p. 388, 1883 ; Day, Fish. Grt. Brit. & Ireland, i, p. 249, pl. lxix, 1884 ; Vaillant, Exped. Sci. Travailleur et Talisman, p. 338, pl. xxvii, fig. 3, 1888 ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 137 (**S. Africa**).

Silurus cornutus, Forsk. Descr. anim. p. 66, 1775 (Marseilles).

Macrorhamphosus cornutus, Lacép. Hist. Poiss. v, pp. 136 & 137, 1803 (No locality).

Solenostomus scolopax, Risso, Ichth. Nice, p. 80, 1810.

Striped-nose Trumpet-fish, Pennant, British Zool. ed. 1812, iii, p. 190.

Macrorhamphosus scolopax, Goode & Bean, Ocean Ichth., in Spec. Bull. U.S. Nat. Mus. 1895, p. 483, pl. cxvii, fig. 396 (Not unusual in Mediterranean, has been found on S. coast England and in Massachusetts Bay ; off coasts of Morocco, Soudan, etc.) ; Jord. & Everm. Fish. N. and M. Amer. p. 759, 1896 (Mediterranean Sea, occasionally northwards to southern England ; accidental on North Atlantic coast of America) ; Regan, Ann. & Mag. Nat. Hist. (8) xiii, 1914, p. 18 (England ; Madeira ; Spain ; Italy).

Skeleton, Rosenth. Ichthyot. Taf. tab. 10, figs. 11, 12 (incorrect ; copied by Yarrell), 1839.

FAMILY SYNGNATHIDAE.

Syngnathus, Linn.

Syngnathus sp., Artedi, Genera, 1738, and Synon. Pisc. p. 1, 1738 (part).

Syngnathus, Linn. Syst. Nat. Ed. x, p. 336, 1758 ; Günth. Cat. Fish. viii, p. 155, 1870.

Halicampus, Kaup, Lophobranchii, p. 22, 1856.

Trachyrhamphus, Kaup, t.c.p. 23.

Corythoichthys, Kaup, t.c.p. 25.

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Syngnathus acus, Linn.

(Pipe-fish.)

- Acus 2de sp.*, Rondel. viii, c. 4, p. 229, 1554; Aldrov. i, c. 22, p. 105, 1638.
- Syngnathus sp.*, Artedi, Gen. p. 1, No. 3; Synon. p. 2, No. 3; Spec. p. 3, No. 3, 1738.
- Syngnathus acus*, Linn. Syst. Nat. i, p. 416, 1758; Bl. Ichth. tab. 91, fig. 2, 1797; Lacép. Hist. Poiss. ii, p. 39, pl. 2, fig. 1, 1800 (Caspian Sea; Coast of Carolina; **Cape of Good Hope**); Bl. Schn. Syst. Ichth. p. 414, 1801; Turton, British Faun. p. 116, 1807; Fleming, British Anim. p. 175, 1828; Michahelles, Isis, 1829, p. 1012; Jenyns, Man. p. 484, 1835; Yarrell, British Fish. 1st ed. ii, p. 325, 1836; 2nd ed. ii, p. 432, 1841; 3rd ed. ii, p. 400, 1859; Fries, Wiegman. Arch. 1838, p. 239; Parnell, Werner. Mem. vii, p. 394; Kaup, Lophobr. p. 41, 1856 (Atlantic Ocean; rarely from Adriatic); Günth. Cat. Fish. viii, p. 157, 1870 (Bohuslän; Holland; British Coast; Guernsey; Madeira; Gibraltar; Mediterranean; Black Sea; **Cape of Good Hope**; Madagascar); Day, British Fish. ii, p. 259, pl. cxliv, figs. 1 & 2, 1884; Grandid. Madagascar, Poiss. p. 516, 1891; Jatzow & Lenz, Fische Ost-afrik. Madag. Ald. p. 529, 1898 (Zanzibar); Herdm. & Daw. Fish. Irish Sea, p. 56, 1902 (Dee; Mersey; Menai Straits, etc.); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 156 (**S. Africa**), and Mar. Inv. S. Afr. iii, 1905, p. 140 (**False Bay**: Eggs).
- Syngnathus typhle*, Bl. Ichth. tab. 91, fig. 1, 1797; Bl. Schn. Syst. Ichth. p. 414, 1801.
- Syngnathus pelagicus*, Turton, Brit. Faun. p. 117, 1807; Donovan, British Fish. iii, pl. 58, 1808; Fleming, British An. p. 176, 1828; Jenyns, Man. p. 486, 1835.
- Syngnathus rubescens*, Risso, Ichth. Nice, p. 66, 1810, and Eur. Mérid. iii, p. 180, 1827; Kaup, Lophobr. p. 43, 1856 (Canary Islds.; **Cape of Good Hope**).
- Syngnathus variegatus*, Pall. Zoogr. Ross.-Asi. iii, p. 119, 1811; Rathke, Mém. Ac. Sc. St. Petersb. Sav. étrang. iii, p. 315, pl. 2, figs. 7 & 8; Nordm. in Démid. Voy. Russ. Mérid. iii, p. 541, 1840; Kaup, t.c.p. 42 (Black Sea).
- Syngnathus ferrugineus*, Michahelles, Isis, 1829, p. 1013 (Black Sea).
- Syngnathus tenuirostris*, Rathke, t.c.p. 313, pl. 2, figs. 11 & 12 (head); Nordm. t.c.p. 541, pl. 32, fig. 2; Kaup. t.c.p. 44 (Adriatic & Black Seas).
- Syngnathus bucculentus*, Rathke, t.c.p. 317, pl. 2, figs. 9 & 10; Nordm. t.c.p. 542, pl. 32, fig. 3 (young).
- Syngnathus brevirostris*, Kaup, t.c.p. 37, young (Trieste).
- Syngnathus agassizi*, Kaup, t.c.p. 38, young, not Michahelles (Black Sea; Naples; Norway).

Syngnathus cuvieri, Kaup, t.c.p. 38, young (Catwyk, North Sea ; Naples).

Syngnathus delalandii, Kaup, t.c.p. 45 (**Cape of Good Hope ; Cape Seas**) ; Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**South Africa**).

***Syngnathus pelagicus*, Osbeck.**

Syngnathus pelagicus, Osbeck, Dagbök Resa Ostind. p. 305, 1757 (Open sea in floating seaweed), and Voy. China, ii, p. 113, 1771 ; Linn. Syst. Nat. ed. x, p. 337, 1758 (after Osbeck) and ed. xii, p. 416, 1766 (Charlestown, S. Carolina) ; Bl. Ichth. tab. 109, fig. 4, 1797 ; Lacép. Hist. Poiss, ii, p. 39, 1800 (Caspian Sea ; Carolina ; **Cape of Good Hope**) ; Bl. Schn. Syst. Ichth. p. 515, 1801 ; (Linn.) Kaup, Lophobr. p. 36, 1856 (**Cape of Good Hope**) ; Blkr. Visch. v.d. Kaap, p. 56, Name only, 1860 (**South Africa**) ; Günth. Cat. Fish. viii, p. 165, 1870 (Mediterranean ; Atlantic ; Mid-Atlantic ; West Indies ; Cuba ; Falkland Islds. ; S. Australia ; New Zealand ; China ; Mauritius) and *Challenger* Shore Fishes, p. 11, Name only, 1880 (Gulf weed, S. of Bermuda) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 156 (**S. Africa**) ; Waite, List Fishes New Zealand, p. 14, 1907.

Syngnathus ethon, Risso, Eur. Mérid. iii, p. 182, 1827 (Nice).
Syngnathus elucens, Poey, Repert. Fis.-nat. Cuba, ii, p. 443 (Havana).

Siphostoma pelagicum, Jord. & Everm. Fish. N. and Mid. Amer. p. 767, 1896 (Venice ; very common in the Mediterranean ; tropical parts of the Atlantic ; occasional in the West Indies).

***Syngnathus phlegon*, Risso.**

Risso, Eur. Mérid. iii, p. 181, 1827 ; Kaup, Lophobr. p. 41, 1856 (Palermo ; Cosseir ; **Cape of Good Hope**) ; Blkr. Visch. v.d. Kaap, p. 56, Name only, 1860 (**S. Africa**) ; Günth. Cat. Fish. viii, p. 156, 1870 (Southern Europe ; Mediterranean and neighbouring parts of Atlantic ; **Cape of Good Hope**) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 156 (**South Africa**).

***Syngnathus temmincki*, Kaup.**

Kaup, Lophobr. p. 36, 1856 (**Cape of Good Hope**) ; Blk. Visch. v.d. Kaap, p. 56, Name only, 1860 (**S. Africa**) ; Günth. Cat. Fish. viii, p. 165, 1870 (**Cape of Good Hope**) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 156 (**S. Africa**).

***Hippocampus*, Rafinesque.**

Rafinesque, Ind. d'Ittiologia Siciliana, p. 37, 1810 ; Leach, Zool. Misc. 1814, p. 103 ; Günth. Cat. Fish. viii, p. 198, 1870 ; Jord. & Everm. Fish. N. and Mid. Amer., p. 775, 1896.

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Hippocampus capensis, Blgr.

(Sea-horse.)

? *Hippocampus*, sp. Cast. Mem. Poiss. Afr. Austr. p. 74, 1861
(**Cape Seas**).

Hippocampus capensis, Bouleng. Mar. Inv. S. Afr. i, 1902,
p. 11, pl. iii, fig. 2 (**Knysna Harbour**); Gilchr. Cat. Fish.
in Mar. Inv. S. Afr. i, 1902, p. 156 (**S. Africa**).

SUB-ORDER **Percesoces.**FAMILY **SCOMBRESOCIDAE.****Scombresox**, Lacép.

Scombresox, Lacép. Hist. Nat. Poiss. v, p. 344, 1803; Cuv. &
Val. Hist. Nat. Poiss. xviii, 1846; Günth. Cat. Fish. vi,
p. 256, 1866; Jord. & Everm. Fish. N. and Mid. America,
p. 725, 1896.

Sayris, Rafinesque, Caratteri Nuovi Generi, etc., p. 60, 1810.

Grammiconotus, Costa, Annuario Mus. Zool. Napoli, 1862, p. 55.

Scombresox rondeleti, C. & V.

Acus altera minor, Bellon. Aquat. p. 163, 1553.

Saurus, Rondel. i, p. 232, 1554.

Sayris serratus, Rafinesque, Carat. p. 61, 1810, after Rondelet.

Scombresox camperii, Risso, Ichth. Nice, p. 334, 1810, and
Eur. Mérid. iii, p. 444, 1827 (not Lacép.).

Scombresox saurus, Valenc. in Cuv. Règne Anim. Ill. Poiss.
p. 98, fig. 1, 1829.

Sayris camperi, Bonap. Faun. Ital. Pesc. 1841.

Scombresox rondeletii, Cuv. & Val. xviii, p. 472, 1846 (Mediterranean); Blkr. Visch. v.d. Kaap, p. 56, Name only, 1860 (**South Africa**); Günth. Cat. Fish. vi, p. 258, 1866 (Mediterranean); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**South Africa**).

Grammiconotus bicolor, Costa, Ann. Mus. Zool. Napoli, i, 1862,
p. 55, taf. 1, fig. 4, very young (Naples).

Scombresox saurus, Walbaum.

Lacertas vel Saurus, Willughby, Hist. Pisc. p. 232, 1686.

Skipper, Ray, Synops. p. 165, 1713.

Saury Pike, Pennant, British Zool. iii, p. 284, pl. 64, 1769,
and ed. 1812, iii, p. 424, pl. 75, and Tour, Scotland, 2nd
ed. p. 298, taf. 17, fig. 2; Yarrell, British Fish. 1st ed. i,
p. 394 and 2nd ed. i, p. 446, 1841.

Esox saurus, Walbaum, Artedi Pisc. iii, p. 93, 1792 (Cornwall),
after the *Saury Pike* of Pennant; Bl. Schn. Syst. Ichth.
p. 394, taf. 78, fig. 2, 1801; Rackett, Trans. Linn. Soc.
vii, p. 60, taf. 5; Turton, British Faun. p. 105, 1807;
Donovan, British Fish. v, pl. 116, 1808; Neill, Werner.
Mem. i, 1811, p. 541.

- Scombresox camperii*, Lacép. Hist. Poiss. v, p. 345, pl. 6, fig. 3, 1803 (No locality stated); Kröyer, Danm. Fisk. iii, p. 278, 1838; Cuv. & Val. xviii, p. 464, pl. 551, 1846; Thompson, Nat. Hist. Ireland, iv, p. 142, 1856; Yarrell, British Fish. 3rd ed. i, p. 465, 1859; Nilss. Ofvers Svensk. Vet. Ak. Förhandl. 1864, p. 501.
- Sayris recurvirostris*, Rafinesque, Caratteri, p. 61, 1810 (substitute for *camperi*).
- Sayris hians*, Rafinesque, t.c.p. 61 (Palermo).
- Sayris bimaculatus*, Rafinesque, t.c.p. 62 (Palermo).
- Scombresox scutellatum*, Lesueur, Journ. Ac. Sc. Philad. ii, 1821, p. 132 (Newfoundland).
- Scombresox aequirostrum*, Lesueur, t.c.p. 132 (Locality unknown); Delfin, Cat. Peces, Chile, p. 45, 1901 (Juan Fernandez).
- Scombresox saurus*, Fleming, British An. p. 184, 1828; Parnell, Werner. Mem. vii, p. 276; Blkr. Visch. v.d. Kaap, p. 56, Name only, 1860 (**South Africa**); Günth. Cat. Fish. vi, p. 257, 1866 (British coast; Banks of Newfoundland; North Atlantic; St. Helena; **Cape of Good Hope**); Lutken, Spolia Atlantica, p. 567, 1880; Jord. & Gilbert, Synops. p. 375, 1883; Day, British Fish. ii, p. 151, pl. cxxvii, fig. 2, 1884; Jord. & Everm. Fish. N. and Mid. Amer. p. 725, 1896 (Temperate parts of Atlantic Ocean; rather common, in schools, on both coasts, especially North of Cape Cod and France; found in the open sea); Herdm. & Daw. Fish. Irish Sea, p. 59, 1902 (Belfast and East coast of Ireland; Swansea Bay, South Wales); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**South Africa**); Holt & Byrne, Fishes Irish Atlantic Coast, in Fisheries, Ireland, Sci. Invest. 1908, v (1910), p. 5 (Name only).
- Belone saurus*, Jenyns, Man. p. 419, 1835.
- Scombresox storeri*, Dekay, New York Faun. Fish. p. 229, pl. 35, fig. 3 (very bad), 1842 (Banks of Newfoundland; Coast of Massachusetts; New York).
- Scombresox scutellatus*, Cuv. & Val. xviii, p. 477, 1846 (St. Helena; Ile de France; Newfoundland).
- ? *Scombresox forsteri*, C. & V. t.c.p. 481 (New Zealand); McCulloch, Endeavour Results, 1911, p. 30 (120 m. S.S.W. of Francis Isld., South Australia).
- Bill-fish*, Storer, Fish. Massachusetts, p. 100, 1867.

Petalichthys, Regan.

Regan, Ann. & Mag. Nat. Hist. series 7, vol. xiv, 1904, p. 129.

Petalichthys capensis, Regan.

Regan, Ann. & Mag. Nat. Hist. (7) xiv, 1904, p. 129 (**Port Elizabeth**).

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Hemirhamphus, Cuv.

- Hemirhamphus*, Cuv. Règne Anim. ed. 1, p. 11, 1817; Cuv. & Val. Hist. Nat. Poiss. xix, p. 1, 1846; Günth. Cat. Fish. vi, p. 259, 1866; Jord. & Everm. Fish. N. and Mid. Amer. p. 722, 1896; Bouleng. Freshw. Fish. Africa, iii, p. 14, 1915.
Hyporhamphus, Gill, Proc. Acad. Nat. Sci. Philadelphia, 1859, p. 131, and 1863, p. 272.
Euleptorhamphus, Gill, t.c. 1859, p. 156.
Zenarchopterus, *Oxyporhamphus*, Gill, t.c. 1863, p. 273.
Dermatogenys (K. & v. H.), Peters, Monats. Ak. Wiss. Berlin, 1865, p. 133.
Hemirhamphodon, Bleeker, Ned. Tijdschr. Dierk. iii, p. 139, 1866.

Hemirhamphus calabaricus, Günth.

- Günth. Cat. Fish. vi, p. 266, 1866 (Old Calabar; West Africa). It is also found at **Knysna** where it is known as the *Needle-fish*. and is reported from **False Bay**.

Exocoetus (Artedi), Linn.

- Exocoetus*, Artedi, Genera Piscium, p. 6, 1738; Linn. Syst. Nat. ed. x, p. 316, 1758; Günth. Cat. Fish. vi, p. 277, 1866; Jord. & Everm. Fish. N. and Mid. Amer. p. 730, 1896.
Cypselurus, Swainson, Class'n. Fish. Rept. Amph. ii, p. 296, 1839.
Exocoetus, *Halocypselus*, *Cypselurus*, Weinland, Proc. Boston Soc. Nat. Hist. vi, 1859, p. 385.
Parexocoetus, *Cypselurus*, *Exocoetus*, Bleeker, Ned. Tijds. Dierk. iii, p. 105, 1866.

Exocoetus altipinnis, C. & V.

- Cuv. & Val. xix, p. 109, pl. 560, 1846 (Indian Ocean; **Cape of Good Hope**); Blkr. Visch. v. d. Kaap, p. 56, Name only, 1860 (**South Africa**), and Atlas Ichth. vi, 1866, Scomb. t.1, fig. 3 (ventrals too short); Cast. Mem. Poiss. Afr. Austr. p. 64, 1861 (sent from **Algoa Bay**, probably does not leave **L'Agulhas Bank**); Günth. Cat. Fish. vi, p. 290, 1866 (Indian Ocean); Day, Proc. Zool. Soc. 1888, and Fish. Ind. p. 807, 1888 (Bombay; it extends to the Malay Archipelago); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**S. Africa**).

Exocoetus chloropterus, C. & V.

- Cuv. & Val. xix, p. 109, 1846 (Lat. 30° 14' S.; Long. 44° 30' W.); Blkr. Visch. v.d. Kaap, p. 56, Name only, 1860 (**South Africa**); Günth. Cat. Fish. vi, p. 277, 1866 (Lat. 30° 14' S.; Long. 44° 30' W.); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 153 (**South Africa**).

Exocoetus evolans, Linn.

(Flying-fish.)

Dutertre, Hist. Antilles, ii, p. 212, 1654; Rochefort, Hist. Antilles, i, p. 372, 1658; Catesby, Carol. tab. 8, 1732.

Exocoetus pinnis ventralibus brevissimus, Gronov. Zoophyl. p. 358, 1763 (Spain).

Exocoetus evolans, Linn. Syst. Nat. ed. xii, p. 521, 1766 (based on Gronov.); Bl. Aust. Fische, taf. 398, 1795; Gmel. Linn. Syst. Nat. ed. xiii, p. 1400, 1797; Bl. Schn. Syst. Ichth. p. 430, tab. 84, 1801; Cuv. & Val. xix, p. 138, 1846 (Mediterranean; Cape Verde; Ceylon; Bourbon; Ile de France; Arabia; New Zealand; New Holland; Tongatabu); Gronov. Syst. ed. Gray, p. 145, 1854 (Spanish and American Seas); Yarrell, British Fish. 3rd ed. 1859, i, p. 474; Blkr. Visch. v.d. Kaap, pp. 56, 76-78, 1860 (**South Atlantic Ocean**), and Atlas Ichth. vi, p. 69, 1866; Kner, Novara, Fische, p. 326, 1865; Günth. Cat. Fish. vi, p. 282, 1866 (Mediterranean; Demerara; midway between Zanzibar and Seychelles; India; China Seas; Japan; North coast Australia; seas of tropical and temperate zones), and Fish. Zanzibar, p. 118, 1866 (East coast Africa); Lutken, Vid. Medd. Naturh. Foren. p. 395, fig. 102, 1876; Day, Fish. Ind. p. 519, pl. cxx, fig. 5, 1878 (Bombay; numerous at the Andamans); Pfeffer, Ost-afrik. Fische, p. 40, 1893 (Red Sea); Waite, Mem. Austral. Mus. iv, 1899, p. 57 (Off Wollongong; Lord Howe Isld.); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**S. Africa**); Herdm. & Daw. Fish. Irish Sea, p. 59, 1902 (Occasionally recorded); Regan, Trans. Linn. Soc. 1908, xii, pt. 3, p. 220 (30 m. West of Great Chagos Bank; Seychelles); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 106, 1913 (Atlantic coast; Yokohama).

Exocoetus volitans, Pennant, British Zool. p. 441, tab. 78, 1769; Lacép. Hist. Poiss. 5, p. 401, pl. 12, fig. 2, 1803 (Warm and temperate seas; English Channel); Donovan, British Fish. ii, p. 31, 1808; Brown, Philos. Trans. lxviii, p. 790, pl. 12; Bennett, Whaling Voy. ii, p. 284, 1840; Yarrell, British Fish. 2nd ed. 1841, i, p. 453; Jord. & Everm. Fish. Hawaiian Islds. in Bull. U.S. Fish Comm. 1903 (1905), p. 132, fig. 45 (Honolulu; Oahu; Lat. 28° 03' 42" N., Long. 143° 10' 45" W.); Seale, Bishop Mus. Occ. papers, 1906, p. 15 (Tahiti; Society Islds.).

Flying Fish, White, Voy. N. S. Wales, pl. 52, fig. 2, 1790.

Exocoetus splendens, Clarck Abel, Narr. Voy. China, p. 4, 1818 (China), *vide* Valenciennes.

Exocoetus volans (Solander), Richards, Ichth. China, p. 264, 1846.

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- Exocoetus georgianus*, Cuv. & Val. xix, p. 139, 1846 (5° N., 92° W.); Günth. Cat. Fish. vi, p. 279, 1866 (5° S., 90° E.); Lutken, Vid. Medd. Naturh. Foren. p. 394, fig. 101, 1876 (Sea of China young examples, with barbel).
- ? *Exocoetus monocirrhus*, Richards. Ichth. China, p. 265, 1846 (China); Günth. l.c. (young examples, with barbel).
- Exocoetus chilensis*, Abbot, Proc. Ac. Nat. Sc. Philad. 1860, p. 472 (Chile); Günth. Cat. Fish. vi, p. 283, 1866 (Chile); Delfin, Cat. Peces Chile, p. 44, 1901.
- Exocoetus obtusirostris*, Günth. t.c.p. 283, 1866 (New Orleans; Cape Verde Islds.; India; open sea); Lutken, Vid. Medd. Naturh. Foren. p. 395, 1876.
- Halocypselus evolans*, Jord. & Gilbert, Synops. p. 377, 1883; Jord. & Meek, Proc. U.S. Nat. Mus. 1885, p. 49; Jord. & Everm. Fish. N. and Mid. Amer. p. 729, 1896 (In all warm seas, north in summer to Newfoundland, England, and the Hawaiian Islds.; rather common on our (American) Atlantic coast, where it spawns in summer; not known from California or the West coast of Mexico).
- Halocypselus obtusirostris*, Jord. & Gilbert, t.c.p. 378.

Exocoetus longipinnis, Cast.

- Casteln. Mem. Poiss. Afr. Austr. p. 64, 1861 (Found on **Agulhas Bank**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**South Africa**).

Tylosurus, Cocco.

- Tylosurus*, Cocco, Lettere in Giorn. Sc. Sicilia, xvii, 1829, p. 18; Jord. & Everm. Fish. N. and Mid. Amer. p. 708, 1896.
- Belone*, Günth. Cat. Fish. vi, p. 234, 1866.

Tylosurus capensis, Günth.

- Belone capensis*, Günth. Cat. Fish. vi, 1866, p. 247 (**Cape of Good Hope**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 152 (**S. Africa**).

FAMILY AMMODYTIDAE.

Ammodytes, Artedi.

- Ammodytes*, Artedi, Genera Pisc. p. 16, 1738; (Artedi) Linn. Syst. Nat. ed. x, p. 247, 1758; Günth. Cat. Fish. iv, p. 384, 1862; Jord. & Everm. Fish. N. and Mid. Amer. p. 832, 1896.

Ammodytes sculus, Swainson.

- Swainson, Zool. Illust. 2nd ser. i, pl. 63, fig. 1; Günth. Cat. Fish. iv, p. 386, 1862 (Mediterranean; Sicily); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 159 (**False Bay**; **Kalk Bay**, **Cape of Good Hope**).

FAMILY **ATHERINIDAE.****Atherina**, Artedi.

Atherina, Artedi, Synon. Pisc. p. 116, 1738; (Artedi) Linn. Syst. Nat. ed. x, p. 315, 1758, and ed. xii, i, p. 519, 1766; Cuv. & Val. Hist. Nat. Poiss. x, p. 413, 1850; Günth. Cat. Fish. iii, p. 392, 1861; Jord. & Everm. Fish. N. and Mid. Amer. p. 789, 1896; Clementina Borsieri, Contr. Con. Sp. Eur. *Atherina*, 1904; Bouleng. Fish. Nile, p. 423, 1907, and Freshw. Fish. Africa, iv, p. 73, 1916.

Atherina (part), Cuv. Règne Anim. 1817.

Membras, Bonaparte, Faun. Italica, Pesc. 1836.

Ischnomembras, F. W. Fowler, Proc. Ac. Philad. iv, 1904, p. 730.

Atherina breviceps, C. & V.

(*Spieringtje*; Assous.)

Cuv. & Val. x, p. 445, 1835 (**Cape**); Blkr. Visch. v.d. Kaap, pp. 50, 54 & 68, 1860 (**Cape of Good Hope**); Casteln. Mém. Poiss. Afr. Austr. p. 45, 1861 (**Cape**, abundant in August); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 135 (**S. Africa**.)

Atherina parvipinnis, C. & V.

Cuv. & Val. x, p. 446, 1835 (**Cape**); Blkr. Visch. v.d. Kaap, p. 54, name only, 1860 (**Cape Seas**); Casteln. Mém. Poiss. Afr. Austr., name only, 1861 (**Cape of Good Hope**); Günth. Cat. Fish. iii, p. 396, 1861 (**Cape of Good Hope**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 135 (**S. Africa**.)

FAMILY **MUGILIDAE.****Mugil**, Artedi.

Mugil, Artedi, Genera Pisc. p. 32, 1738, and in Linn. Syst. Nat. ed. x, p. 316, 1758; Cuv. & Val. Hist. Nat. Poiss. xi, p. 7, 1836; Günth. Cat. Fish. iii, p. 409, 1861; Jord. & Everm. Fish. N. and Mid. Amer. p. 809, 1896; Bouleng. Poiss. Bass. Congo, p. 352, 1901, Fish. Nile, p. 427, 1907, and Freshw. Fish. Africa, iv, p. 78, 1916.

Liza, Jord. & Swain, Proc. U.S. Nat. Mus. vii, 1884, p. 261.

Mugil auratus, Risso.

Daurin (Nice); *Lotregano* (Venice).

Mugil auratus, Risso, Ichth. Nice, p. 344, 1810; Bonap. Icon. Faun. Ital. Pesc. 1834; Cuv. & Val. xi, p. 43, pl. 308, 1836 (Mediterranean); Lowe, Proc. Zool. Soc. 1843, p. 86, and Fish. Madeira, p. 163, 1860; Guichen. Explor. Algér. Poiss. p. 67, 1850; Günth. Ann. & Mag. Nat. Hist. (3) vii, 1861, p. 346, and Cat. Fish. iii, p. 442, 1861 (Lanzarote; [C.P. 3—1916.]

- England ; Mediterranean) ; Steindr. Sitzb. Ak. Wien, lxii, i, 1868, p. 682 ; Moreau, Poiss. France, iii, p. 185, 1881 ; Lilljeb. Sver.-Norg. Fisk. i, p. 413, 1884 ; Smitt. Scand. Fish. i, p. 339, 1893 ; Bouleng. Poiss. Bass. Congo, p. 356, 1901, Fish. Nile, p. 435, pl. lxxxi, fig. 2, 1907, and Freshw. Fish. Africa, iv, p. 87, fig. 50, 1916 (Atlantic and Mediterranean, from Scandinavia to **South Africa**).
- Mugil cryptochilus*, Cuv. & Val. t.c.p. 61 (Nile) ; Günth. Petherick's Trav. ii, p. 213, 1869 (Nile).
- Mugil chelo* (non Cuv.), Lowe, Trans. Zool. Soc. ii, 1839, p. 184.
- Mugil maderensis*, Lowe, Proc. Zool. Soc. 1839, p. 82, and Trans. Zool. Soc. iii, 1842, p. 8.
- Mugil natalensis*, Casteln. Mém. Poiss. Afr. Austr. p. 50, 1861 (Natal) ; Gilchr. & Thomp. Ann. S. Afr. Mus. xi, 1911, p. 43 (Natal, taken in tidal waters ; common).
- Mugil octoradiatus*, Günth. Ann. & Mag. Nat. Hist. (3) vii, 1861, p. 347.
- Mugil octoradiatus*, part., Günth. Cat. Fish. t.c.p. 437.
- ?*Mugil saliens* (non Risso), Günth. Petherick's Trav. ii, p. 213, 1869.
- Myxus curvidens*, Steindr. Denkschr. Ak. Wien, xlv, 1882, p. 42.

Mugil capito, Cuv.

(Harder.)

- The Grey Mullet* ; *Cefalo calamita* (Rome) ; *Canstello* (Venice) ; *Bouri* (Egypt).
- Meuille blanc*, Duhamel, Peches, ii, sect. 6, p. 147, pl. ii, fig. 3, 1777.
- Mugil capito*, Cuv. Règne Anim. 2nd ed. ii, p. 232, 1829 ; Bonap. Faun. Ital. Pesc. 1834 ; Cuv. & Val. xi, p. 36, pl. 308, 1836 (Mediterranean ; Norway ; The Ocean) ; Jenyns, Vert. Anim. p. 374, 1835 ; Yarrell, British Fish. i, p. 200, 1836, or 2nd ed. i, p. 234, 1841, or 3rd ed. ii, p. 175, 1859 ; Parnell, Fish. Firth of Forth, p. 65, 1838 (copied from Jenyns) ; Guichen. Explor. Algér. Poiss. p. 67, 1850 ; Nilss. Skand. Faun. iv, p. 176, 1855 ; Günth. Ann. & Mag. Nat. Hist. (3) vii, 1861, p. 346, and Cat. Fish. iii, p. 439, 1861 (British coast ; Lisbon ; Dalmatia ; Mediterranean ; Nile (Cairo) ; **Cape of Good Hope**), and in Petherick's Trav. ii, p. 210, 1869 (Nile at Cairo) ; Blanchard, Poiss. France, p. 248, fig., 1866 ; Steindr. Sitzb. Ak. Wien, lvii, i, 1868, p. 680 ; Moreau, Poiss. France, iii, p. 188, 1881 ; Day, British Fish. p. 230, pl. xlvi, 1881 ; Lortet, Arch. Mus. Lyon, iii, 1883, p. 131, pl. x, fig. 2 (Lake Tiberias) ; Lilljeborg, Sver.-Norg. Fisk. i, p. 408, 1884 ; Smitt, Scand. Fish. i, p. 339, fig., 1893 ; Bouleng. Poiss. Bass. Congo, p. 355, 1901, Fish. Nile, p. 432, pl. lxxx, fig. 2, and lxxxi, fig. 1, 1907 (Lake Menzaleh and freshwater canal ; Lake Tamsah ; Nile at

- Cairo and near Samannud. Known from all the coasts of the Mediterranean and of the Atlantic from Scandinavia to the Congo ; it readily enters fresh waters and is said to extend up the Nile as far as the First Cataract), and Freshw. Fish. Africa, iv, p. 83, fig. 49, 1916 (Atlantic and Mediterranean, from Scandinavia to **South Africa**) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 136 (**S. Africa**) ; Gilchr. & Thomp. Ann. S. Afr. Mus. xi, pt. 2, 1911, p. 44 (Natal).
- Mugil cephalus* (non Linn.), Donovan, British Fish. i, pl. xv, 1802.
- Mugil cephalus*, var. A., Risso, Ichth. Nice, p. 344, 1810 (Nice).
- Mugil ramada*, Risso, Eur. Mérid. iii, p. 390, 1827.
- Mugil britannicus*, Hancock, Lond. Quart. Journ. Sc. 1830, p. 129.
- Mugil dubahra*, Cuv. & Val. xi, p. 60, 1836 (Nile).
- Mugil capensis* (non Cuv. & Val.), A. Smith, Ill. Zool. S. Afr. Pisces, pl. 30, fig. 1, 1849 (Seas of Eastern and **Western Coasts** and also some of the rivers and lakes of the **Colony**) ; Pappe, Synops. Ed. Fish. C.G. Hope, 1853, p. 26, and 2nd ed. 1866, p. 19 (*Harder, Mullet* ; enters mouths of rivers) ; Blkr. Visch. v.d. Kaap, pp. 54 & 69, 1860 (*Harder, Mullet* ; **Cape Seas**) ; Casteln. Mém. Poiss. Afr. Austr. p. 46, 1861 (*Springer* ; **Table Bay**).
- Mugil multilineatus*, Smith, t.c. pl. 30, fig. 2, 1849 (East and West coasts of **S. Africa** and also some of the rivers of the interior) ; Blkr. Visch. v.d. Kaap, p. 54, name only, 1860 (**Cape Seas**) ; Günth. Cat. Fish. iii, p. 443, 1861 (Coasts and rivers of the **Cape**) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 136 (**S. Africa**).
- Mugil smithii*, Casteln. t.c.p. 47 (Very common in **Table Bay** market).
- Mugil octoradiatus*, Günth. t.c.p. 437 (part) ; Lortet, t.c.p. 133, pl. xi, fig. 2.
- Mugil petherici*, Günth. t.c.p. 441, and in Petherick's Trav. ii, p. 211, 1869 (Nile at Cairo).
- Mugil curtus* (non Yarrell), Lortet, t.c.p. 132, pl. xi, fig. 1, 1883.
- Mugil auratus* (non Risso), Lortet, t.c.p. 134, pl. xi, fig. 3.
- ?*Liza alosoides*, H. W. Fowler, Proc. Ac. Philad. lv, 1903, p. 746, pl. xlv.

Mugil cephalus, Linn.

- Cefalo* (Rome) ; *Cievolò* (Venice) ; *Carida* (Nice) ; *Bouri*, *Bouria* (Egypt, Tunis).
- Mugil cephalus*, Linn. Syst. Nat. ed. x, p. 316, 1758 (Europe), based on Artedi ; and ed. xii, i, p. 520, 1766 ; Sonnini, Voy. Egypte, ii, p. 296, pl. xxiii, fig. 2, 1799 ; Delaroche, Ann. Mus. xiii, 1809, p. 358, pl. xx, fig. 4 ; Risso, Ichth. Nice, p. 343, 1810 ; and Eur. Mérid. iii, p. 388, 1827 ; Cuv. Règne Anim. 2nd ed. ii, p. 231, 1829 ; Bonap. Icon.

Faun. Ital. Pesc. 1834; and Cat. Met. Pesc. p. 60, 1850; Cuv. & Val. xi, p. 19, pl. cccvii, 1836 (Mediterranean); Nordm. in Demid. Voy. Russ. Mériid. iii, p. 395, 1840; Lowe, Proc. Zool. Soc. 1843, p. 86; Guichen, Explor. Algér. Poiss. p. 67, 1850; Gronov. Syst. ed. Gray, p. 162, 1854 (Atlantic Ocean, young floating in Sargasso weed); Günth. Cat. Fish. iii, p. 417, 1861 (Mediterranean; Nile; Freshwater lakes of Tunis; Madeira; West coast Africa; River Niger), and *Challenger*, Shore Fish. p. 3, Name only, 1880 (St. Jago); Blanchard, Poiss. France, p. 231, 1866; Steindr. Sitzb. Ak. Wien, lvii, i, 1868, p. 680; lxi, i, 1870, p. 952; and Fisch. Samm. Plate, p. 207, 1903 (Coquimbo); Günth. in Petherick's Trav. ii, p. 209, 1869; Moreau, Poiss. France, iii, p. 183, 1881; Jord. & Swain, Proc. U.S. Nat. Mus. 1884, p. 263; Jord. & Everm. Fish. N. and Mid. Amer. p. 811, 1896 (Coasts of Southern Europe and Northern Africa; Atlantic coast of America, from Cape Cod to Brazil; Pacific coast, in great schools in bays, lagoons and sheltered waters from Monterey to Chile, everywhere very common) and in Fish. Hawaiian Islds. in Bull. U.S. Fish Comm. xxiii, 1903 (1905), pp. 139 and 747 (Honolulu; Kailua; Molokai. The most abundant and important food-fish of the Hawaiian Islds. The young are caught in the open seas and bays and transported to fish-ponds "where they are kept until they attain a marketable size") Steindr. & Speng. Zool. Jahrb. Supp. iv, 2nd pt. p. 315, 1898; Navar. Man. Ict. Marin. Espan. Bal. p. 142, 1899; Delfin, Peces Chile, p. 48, 1901 (Pacific Ocean; Talcahuano; Valparaíso; Juan Fernandez; coast of Sinaloa; California Bay; North of Africa; Mediterranean); Bouleng. Poiss. Bass. Congo, p. 353, 1901, and Fish. Nile, p. 429, pl. lxxx, fig. 1, 1907 (Over the Mediterranean and the Atlantic coasts from the Loire to the Congo and from the United States to Brazil, as well as to the Pacific coast of S. America. It penetrates into the Rhone as far up as Avignon and is on record from the rivers of Algeria and the freshwater lakes of Tunisia. It has been found in the Nile above Cairo, and is said to extend as far south as Assuan), and Freshw. Fish. Africa, iv, p. 80, fig. 47, 1916 (from the Loire and the Mediterranean to **South Africa** and from the United States to Brazil; Pacific coast of South America); Fowler, Proc. Ac. Nat. Sc. Philad. lv, 1904, pp. 743, 744, fig.; Seale, Fish. S. Pacific, in Occ. papers Bishop Mus. iv, No. 1, 1906, p. 17 (Tahiti; Raiatea, Cook Islds.; Nukahiva, Marquesas Isld.; Shortland Isld.; Solomons); Waite, List. Fish. New Zealand, in Rec. Canterbury Mus. i, No. 1, p. 15, 1907; Jord. & Rich. Fish. Philippine Arch. p. 244, 1908 (Calayan); Fowler, Proc. Ac. Nat. Sc. Philad. 1912, p. 35 (Long Island); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 113, 1913 (Hawaii;

- Raiatea ; Tahiti ; New Guinea ; Nukahiva ; Solomon Islds. ; Mediterranean ; Atlantic coasts of U.S. America ; Panama ; Southern California ; Red Sea ; Japan) ; Regan, *Ann. & Mag. Nat. Hist.* (8) xv, 1915, p. 127 (Lagos).
- Mugil albula*, Linn. *Syst. Nat.* ed. xii, p. 520, 1766 (Charlestown) ; Jord. & Gilb. *Synops.* p. 403, 1883.
- Mugil tang*, Bl. *Ausl. Fische*, viii, p. 171, pl. cccxcv, 1793, and *Ichth.* pl. 395, 1794 (Africa).
- Mugil plumieri*, Bl. *Ausl. Fische*, viii, p. 173, pl. cccxvi, 1793, and *Ichth.* pl. 396, 1794 (St. Vincent), on a drawing by Plumier.
- Mugil lineatus*, Cuv. & Val. t.c.p. 96 (New York).
- Mugil constantiae*, Cuv. & Val. t.c.p. 107 ; Smith, *Ill. Zool. S. Afr. Pisces*, pl. 28, figs. 1 and 1a, 1849 (Freshwater lakes and rivers) ; Günth. t.c.p. 418 (Freshwaters of the **Cape of Good Hope**) ; Casteln. *Mém. Poiss. Afr. Austr.* p. 48, 1861 (*Freshwater Springer* ; peculiar to fresh waters in the neighbourhood of the **Cape**, only caught in winter—June, July, August) ; Blkr. *Visch. v.d. Kaap*, p. 54, name only, 1860 (**Cape Seas**) ; M. Web. *Zool. Jahrb.* x, pt. 2, 1897 (**Cape Colony**, in freshwater pool called "**Small Princess Vlei**") ; Gilchr. *Cat. Fish. in Mar. Inv. S. Afr.* i, 1902, p. 136 (**S. Africa**) ; Regan, *Col. Fish. in Ann. Natal Govt. Mus.* i, pt. 3, 1908, p. 243 (Durban Bay).
- Mugil borbonicus*, Cuv. & Val. t.c.p. 113 (Bourbon) ; Sauvage, *Hist. Madagascar*, Poiss. p. 395, pl. xlii, fig. 3, 1891.
- Mugil japonicus*, Temm. & Schleg. *Faun. Japon.* Poiss. p. 134, pl. lxxii, fig. 1, 1845 (Nagasaki).
- Mugil rammelsbergii*, Tschudi, *Faun. Per. Ichth.* p. 20, 1845 (Peru) ; Delfin, *Cat. Peces, Chile*, p. 48, 1901 (Coasts of Chile and Peru).
- Mugil berlandieri*, Girard, *U.S. Mex. Bound. Survey*, i, *Ichth.* p. 20, pl. x, figs. 1-4, 1859 (Texas coast).
- ? *Mugil camptosiensis*, Casteln. *Mém. Poiss. Afr. Austr.* p. 48, 1861 (Found in **Gamtoos River** near **Algoa Bay**, known as the *Springer*) ; Gilchr. *Cat. Fish. in Mar. Inv. S. Afr.* i, 1902, p. 137 (**S. Africa**).
- Mugil guentheri*, Gill, *Proc. Ac. Nat. Sc. Philad.* 1863, p. 169 (Western coast of Central America) ; not of Steindachner.
- Mugil ashanteensis*, Blkr. *Nat. Verh. Holl. Maatsch. Wetensch.* xviii, 1863, No. 2, p. 91, pl. xix, fig. 2 (Coast of Guinea) ; Steindr. *Sitzb. Ak. Wien*, xli, i, 1870, p. 953.
- Mugil mexicanus*, Steindr. *Sitzb. Ak. Wien*, lxxii, i, 1875, p. 58, pl. viii, and *Ichth. Beitr.* iii, 1875, p. 59 (Acapulco).

***Mugil diadema*, Gilchr. & Thomp.**

(*Diamond Mullet.*)

Mugil diadema, Gilchr. & Thomp. *Ann. S. Afr. Mus.* xi, pt. 2, 1911, p. 42 (Durban Bay).

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Mugil macrolepis, Bouleng. Freshw. Fish. Afr. iv, p. 94, pl. 56, 1916 (**South and East Africa** to Madagascar; eastwards to South Pacific).

(This fish has lately been recorded from the **Zwartkops River, Port Elizabeth**; Dr. Boulenger after examination of the fish recognizes it as a valid species.)

Mugil macrolepis, A. Smith.

Mugil macrolepis, Smith, Ill. Zool. S. Afr. Pisces, pl. 28, fig. 2, 1849, not of Rüppell or Bleeker (inhabits rivers and freshwater lakes); Günth. Cat. Fish. iii, p. 447, 1861 (Rivers and freshwater lakes of the **Cape**); Casteln. Mém. Poiss. Afr. Austr. p. 47, 1861 (**Gamtoos River**, near Algoa Bay); Bouleng. Freshw. Fish. Africa, iv, p. 94, fig. 56, 1916 (**South and East Africa** and Madagascar, eastwards to the South Pacific).

Mugil troschelii, Blkr. Nat. Tijdschr. Nederl. Ind. xvi, 1858, p. 277 (Indian Archipelago); Günth. Cat. Fish. iii, p. 448, 1861 (Coasts of Java, Sumatra, Borneo & Ceylon).

? *Mugil crenilepis*, Casteln. Mém. Poiss. Afr. Austr. p. 49, 1861 (From mouth of **Gamtoos River** and known as *Harder*); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 137 (**S. Africa**).

Mugil smithii (non Casteln.), Günth. t.c.p. 447 (Type of *M. macrolepis*); Sauvage, Hist. Madagascar, Poiss. p. 399, pl. xliB, fig. 4, 1891; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 137 (**South Africa**); Regan, Col. Fish. in Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 243 (Kosi Bay); Bamber, Journ. Linn. Soc. xxxi, 1915, Zool. No. 210, p. 482 (Sudanese Red Sea).

Mugil rodericensis, Günth. Ann. & Mag. Nat. Hist. (4) xvii, 1876, p. 397.

Mugil saliens, Risso.

Filzetta (Tuscany); *Cefalo musino* (Rome); *Flaveton* (Venice); *Verzellata* (Venice); *Bouri* (Nile).

Bouri, Sonnini, Voy. Egypte, ii, p. 296, pl. 23, fig. 2, 1799.

Mugil saliens, Risso, Ichth. Nice, p. 345, 1810; Bonap. Faun. Ital. Pesc. 1834; Cuv. & Val. xi, p. 47, pl. 309, 1836 (Mediterranean); Guichen, Explor. Algér. Poiss. p. 67, 1850; Günth. Cat. Fish. iii, p. 443, 1861 (Mediterranean; Nile); Moreau, Poiss. France, iii, p. 191, 1881; Sauvage, Hist. Madagascar, Poiss. p. 396, 1891; Bouleng. Freshw. Fish. Africa, iv, p. 85, 1916 (From the Gironde and the Mediterranean to **South Africa**).

Mugil capensis, Cuv. & Val. xi, p. 108, 1836 (**Cape of Good Hope**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 135 (**S. Africa**), part.

Mugil richardsonii, Smith, Ill. Zool. S. Afr. Pisces, pl. 29, fig. 1, 1849 (Seas of Eastern and **Western Coasts**); Günth. t.c.p. 440 (**Cape Seas**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 136 (S. Africa).

Mugil euronotus, Smith, t.c. pl. 29, figs. 2 and 2a (Inhabits seas of Eastern and Western coasts of **South Africa**).

FAMILY CHIASMODONTIDAE.

Champsodon, Günth.

Günth. Proc. Zool. Soc. 1867, p. 102; Goode & Bean, Ocean. Ichth. p. 291, 1896.

Champsodon capensis, Regan.

Regan, Linn. Soc. xii, pt. 3, 1908, p. 244, pl. 27, fig. 2 (**South coast of Cape Colony**, 30-35 fms.); Gilchr. & Thomp. Ann. S. Afr. Mus. xiii, pt. 3, 1914, p. 84 (Natal coast, 46-54 fms.).

FAMILY SPHYRAENIDAE.

Sphyraena, Artedi.

Sphyraena, Artedi, Synon. Pisc. p. 112, 1738; Cuv. & Val. Hist. Nat. Poiss. iii, p. 325, 1829; Günth. Cat. Fish. ii, p. 334, 1860; Jord. & Everm. Fish. N. and Mid. Amer. p. 822, 1896; Bouleng. Poiss. Bass. Congo, p. 364, 1901, and Freshw. Fish. Africa, iv, p. 105, 1916.

Sphaerina, Swainson, Class'n. Fishes, ii, p. 175, 1839.

Sphyraena jello, Cuv. & Val.

Esox sphyraena, Russell, Fish. Vizagapatam, ii, p. 59 (not Gmel. Linn.) and *Jellow*, pl. 174, 1803 (Coromandal Coast).

Sphyraena jello, Cuv. & Val. iii, p. 349, 1829 (Vizagapatam); Bélanger, Voy. Indes Orient. Zool. p. 346, pl. 1, fig. 1, 1834; Rüpp. N.W. Fische, p. 88, 1838; Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 56 (Malayo-Molucca Archipelago), and xxvi, 1854-1857, Sphyraen. p. 12 (Indian Archipelago), and Nat. Tijds. Ned. Ind. vii, 1854, p. 369 (Batjan); Cantor, Cat. Malayan Fish. p. 24, 1849; Jerdon, Madras Journ. Lit. Sci. 1851, p. 140; Günth. Cat. Fish. ii, p. 337, 1860 (Amboyna; China; Malay Peninsula; Calcutta; **Cape Seas**); Kner, *Novara*, Fische, p. 139, 1865; Day, Fish. Malabar, p. 64, 1865, and Fish. India, p. 342, 1876 (Red Sea; East coast of Africa; seas of India to Malay Archipelago and beyond); Playfair, Fish. Zanzibar, p. 78, 1866 (Seychelles); Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 823; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 123 (**S. Africa**); Steindr. Fisch. Süd-arab. und Sokotra, p. 23, 1902

(Gischin ; Sheich Othman); Jord. & Everm. Proc. U.S. Nat. Mus. xxv, 1903, p. 333 (Formosa); Everm. & Seale, Fish. Philippine Islds. p. 59, 1907 (Bacon ; Bulan); Jord. & Seale, Fish. Luzon & Panay, p. 11, 1907 (Manila); Jord. & Rich. Fish. Philippine Archip. p. 245, 1908 (Iloilo); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 2, 1908, p. 195 (Natal); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 111, 1913 (**Cape of Good Hope** ; Red Sea ; Bay of Bengal ; Seas of Pinang, Java and Amboyna ; ? Japan) ; Seale, Fishes of Hongkong, p. 61, 1914.

Sphyraena vulgaris, C. & V.

(*European Barracuda*.)

- Σφύρανα*. Aristotle, ix, cap. 2 ; Ælian, i, cap. 33 ; Athen. vii ; Oppian, lib. i, ii, iii.
- Sudis*, Pliny, xxxii, cap. 11 ; Salvian, Aquat. p. 69, 1554.
- Sphyraena*, Rondel. viii. cap. 1, 1554 ; Gesner, Hist. Anim. p. 882, 1558 ; Willughby, Ichth. p. 273, 1686 ; Artedi, Synon. p. 112, 1738.
- Sphyraena s. Sudis*, Salvian, p. 70, 1554 ; Aldrov. De Pisc. i, cap. 21, p. 102, 1638 ; Jonston, Hist. Nat. lib. i, tit. 2, cap. 1, art. 16, tab. 18, fig. 1, 1649 ; Ray, Synops. p. 84, 1713.
- Esox sphyraena*, Linn. Syst. Nat. ed. x, p. 373, 1758 (Mediterranean Sea), after *Sphyraena* of Artedi ; Gmel. Linn. Syst. Nat. p. 1389, 1793.
- Esox spet*, Häny, Encycl. Meth. Poiss. 1787, after Linnaeus ; Lacép. Hist. Nat. Poiss. v, pp. 326 & 328, 1803 (Mediterranean ; Atlantic Ocean) ; Bonap. Faun. Ital. Pesci, cum fig. (juv.), 1841.
- Sphyraena sphyraena*, Bl. Ichth. taf. 389, 1797 ; Bl. Schn. Syst. Ichth. p. 109, 1801 ; Risso, Ichth. Nice, p. 332, 1810 ; Martens, Reise n. Venedig, ii, p. 426, 1824.
- Sphyraena becuna*, Lacép. t.c. pp. 327, 329, pl. 9, fig. 3 (no locality stated) ; Cuv. & Val. iii, p. 340, 1829 (no locality stated) and vii, p. 507 (part) 1831 ; Jord. & Everm. Fish. N. and Mid. Amer. p. 826, 1896 (Coasts of Southern Europe and neighbouring islands ; rather common ; recorded from Bermudas by Dr. Goode).
- Esox becuna*, Shaw, Gen. Zool. v, p. 112, 1803.
- Sphyraena vulgaris*, Cuv. & Val. iii, p. 327, 1829 (Mediterranean) ; Cuv. Règne Anim. Ill. Poiss. pl. 18, fig. 1, 1850 ; Günth. Cat. Fish. ii, p. 334, 1860 (Mediterranean ; Europe ; Lanzerote ; New York), and *Challenger*, Shore Fish. p. 3, Name only, 1880 (St. Jago) ; Blkr. Visch. v.d. Kaap, p. 53, Name only, 1860 (**South Africa**) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 124 (**South Africa**).
- Sphyraena viridescens*, Cuv. & Val. t.c.p. 339 (St. Jago, Cape Verde Islds.).
- Sphyraena guachancho*, Cuv. & Val. t.c.p. 342 (America).

Sphyraena borealis, Dekay, New York Faun. Fish. p. 39, pl. 60, fig. 196, 1842.

Sphyraena spet, Goode, U.S. Nat. Mus. v, 1876, p. 61.

FAMILY STROMATEIDAE.

Nomeus, Cuv.

Cuv. Règne Anim. 1st ed. ii, p. 315, 1817; Cuv. & Val. Hist. Nat. Poiss. ix, p. 242, 1833; Günth. Cat. Fish. ii, p. 387, 1860; Jord. & Everm. Fish. N. and Mid. Amer. p. 949, 1896.

Nomeus gronovii, Gmel.

(*Portuguese Man-of-War*—fish; *Blue-bottle*, of False Bay fishermen.)

Gobius gronovii, Gmel. Linn. Syst. Nat. xiii, p. 1205, 1788 (Tropical America).

Gobiomorus gronovianus, Lacép. Hist. Poiss. ii, p. 584, 1800 (Tropical seas of America).

Eleotris mauritii, Bl. Schn. Syst. Ichth. p. 66, 1801 (Brazil); Cuv. & Val. ix, p. 243, 1833 (Coast of Guinea; American Coast).

Nomeus maculosus, Bennett, Proc. Zool. i, 1833, p. 146 (East Indies).

Seriola argyromelas, Cuv. & Val. t.c. pl. 262, 1833.

Nomeus maculatus, Valenc. in Cuv. Règne Anim. Ill. Poiss. pl. 56, fig. 2, 1850.

Nomeus oxyurus, Poey, Mem. ii, p. 236, 1860 (Havana).

Nomeus gronovii, Günth. Cat. Fish. ii, p. 387, 1860 (South America; **South Atlantic**; Australia), and *Challenger* Shore Fish. p. 9, Name only, 1880 (Bermuda); Goode & Bean, Ocean. Ichth. p. 220, 1896 (Florida coast, ten found swimming under one "*Portuguese Man-of-War*"; abounds in the Sargasso Sea and under *Physalia*); Jord. & Everm. Fish. N. and Mid. Amer. p. 949, 1896 (Tropical parts of the Atlantic and Indian Oceans in rather deep water, swimming near the surface, very abundant in the Sargasso Sea, common North to Florida and Bermuda, occasionally farther; Woods Hole, Massachusetts; Panama; living commonly under the protection of the "*Portuguese Man-of-War*" (*Physalia*); Regan, Stromat. Ann. & Mag. Nat. Hist. (7) x, 1902, p. 122 (no locality stated); Ogilby, Mem. Queensland Mus. V, 1916, p. 185 (Moreton Bay).

Stromateus, Artedi.

Stromateus, Artedi, Genera Piscium, p. 19, 1738; Cuv. & Val. Hist. Nat. Poiss. ix, p. 372, 1833; Günth. Cat. Fish. ii, p. 397, 1860; Regan, Revision *Stromat.*, in Ann. & Mag. Nat. Hist. series 7, x, p. 203, 1902.

Seserinus, Cuv. & Val. t.c.p. 416, 1833.

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Stromateus fiatola, Linn.

Στροματεὺς, Athen. vii, p. 322, circa A.D. 150.

Fiatola (*Callichthys*), Bellon. p. 153, 1551; Rondel. vii, cap. 21, p. 257, 1554; Gesner, Aquat. p. 926, 1558; Aldrov. De Pisc. ii, cap. 24, 1638; Jonston, Hist. Nat. i, tit. 3, cap. 1, art. 13, tab. 19, fig. 8, 1649.

Stromateus, Rondel. v, cap. 24, p. 157, 1554; Gesner, Aquat. iv, p. 925, 1558; Aldrov. De Pisc. ii, cap. 22, p. 192, 1638; Jonston, i, tit. 3, cap. 1, art. 12, tab. 19, fig. 7, 1649; Willughby, Ichth. pp. 156, 157, pls. 1 & 4, fig. 2, 1686; Ray, Synops. p. 50, 1713.

Hepatus, Gesner, t.c.p. 413, 1558.

Stromateus sp. Artedi, Gen. p. 19, 1738.

Stromateus fiatola, Linn. Syst. Nat. ed. xii, i, p. 432, 1766; Lacép. Hist. Poiss. ii, p. 316, 1800 (Mediterranean; Red Sea); Bl. Schn. Syst. Ichth. p. 492, 1801; Risso, Ichth. Nice, p. 100, 1810; Martens, Reise n. Venedig, ii, p. 435, 1824; Bonap. Faun. Ital. Pesc. cum fig. 1841; Cuv. Règne Anim. Ill. Poiss. pl. 63, fig. 1, 1850; Guichen, Explor. Algérie, Poiss. p. 64, 1850; Günth. Cat. Fish. ii, p. 397, 1860 (Mediterranean); Regan, Revis. Stromat. in Ann. & Mag. Nat. Hist. (7) x, 1902, p. 203 (Mediterranean; **South Africa**).

Chrysostromus fiatoloides, Lacép. Hist. Poiss. iv, pp. 697 & 698, 1802 (Mediterranean; Rome).

Stromateus capensis, Pappe, Synops. Ed. Fish. C. G. Hope, 1853, and 2nd ed. p. 18, 1866 (*Katunker*; chiefly **East of Table Bay**, not common); Blkr. Visch. v.d. Kaap, p. 53, Name only, 1860 (**South Africa**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 129 (**South Africa**).

Stromateus microchirus, Bonelli.

(*Pampelmoes*, *Kaapsche Nooitje*, of Cape; *Blue-fish*, of Natal.)

Seserinus, Rondel. ix, cap. 20, p. 257, 1554 (Mediterranean).

Centrolophus microchirus, Bonelli, Mem. Acad. Sc. Torin.

Fiatola fasciata, Risso, Eur. Mérid. iii, p. 289, 1827.

Seserinus microchirus, Cuv. & Val. ix, p. 416, pl. 276, 1833 (Mediterranean).

Stromateus microchirus, Bonap. Faun. Ital. Pesc., with plate, 1834; Günth. Cat. Fish. ii, p. 398, 1860 (Mediterranean); Regan, Revis. Stromat. in Ann. & Mag. Nat. Hist. (7) x, 1902, p. 204 (Mediterranean; **S. Africa**); Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 138 (**Mossel Bay**—ova).

Seserinus rondeletii, Cuv. Règne Anim. Ill. Poiss. pl. 63, fig. 3, 1850.

Cubiceps, Lowe.

Cubiceps, Lowe, Proc. Zool. Soc. 1843, p. 82; Günth. Cat. Fish. ii, p. 388, 1860.

Atimostoma, Smith, Ill. Zool. S. Afr. Pisces, pl. xxiv, 1849.

Navarchus, Filippi & Verany, in Mem. Acad. Sc. Torin, series 2, tom. xviii, 1860, p. 7.

Trachelocirrus, Doumet, Rev. et Mag. Zoologie, p. 163, pl. xv, 1863.

Psenes, Goode & Bean, Oceanic Ichth. p. 220, 1896.

Cubiceps capensis, Smith.

Atimostoma capense, Smith, Ill. Zool. S. Afr. Pisces, pl. xxiv, 1849 (only one imperfect specimen found on beach to northwards of **Cape Town** after a heavy gale of wind); Blkr. Visch. v.d. Kaap, p. 53, Name only, 1860 (**South Africa**).

Cubiceps capensis, Günth. Cat. Fish. ii, p. 389, 1860 (**Cape Seas**); Regan, Stromat. Ann. & Mag. Nat. Hist. (7), x, 1902, p. 123 (**Cape of Good Hope**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 129 (**South Africa**); Ariola, Revista mens. Pesca, 7, pp. 185-192, 1912 (Gulf of Genoa).

SUB-ORDER **Anacanthini**.

FAMILY **MACRURIDAE**.

Macrurus, Bloch.

Macrourus, Bl. Ichth. v, 1787, p. 152; Jord. & Everm. Fish. N. and Mid. Amer. p. 2581, 1898.

Macrurus, Günth. Cat. Fish. iv, p. 390, 1862, corrected spelling; Jord. & Gilbert, Bull. U.S. Nat. Mus. xvi, p. 811; Goode & Bean, Ocean. Ichth. p. 390, 1896.

Macruropus, Bleeker, Versl. Med. K. Akad. Wetensch. Amsterdam, viii, 1874, p. 369.

SUB-GENUS **Coelorhynchus**, Giorna.

Giorna, Mem. Ac. Sci. Turin, xvi, 1803, p. 178.

Macrurus fasciatus, Günth.

Macrurus fasciatus, Günth. Ann. & Mag. Nat. Hist. 1878, ii, p. 24, and *Challenger*, xxii, Deep-sea Fish, p. 129, pl. xxviii, fig. A, 1887 (East coast of Southern extremity of South America, 40-245 fms.); Gilchr. Mar. Inv. S. Africa, iii, 1905, p. 135 (14 miles off **Cape Point**, about 100 fms.).

Coelorhynchus fasciatus, Goode & Bean, Ocean. Ichth. p. 402, 1896 (East coast S. America—quoted).

Macrurus parallelus, Günth.

Macrurus parallelus, Günth. Ann. & Mag. Nat. Hist. xx, 1877, p. 439 (Enoshima); and *Challenger*, xxii, Deep-sea Fish. p. 125, 1887 (off New Zealand, 700 fms.; off Kermadec Islds., 600-630 fms.; off Inoshima, Japan, 345 fms.); South of Japan, 565 fms.); Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 137 (39 miles off **Cape Point**, 310-560 fms.).

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Coelorhynchus parallelus, Jord. & Stark, Bull. U.S. Fish. Comm. 1902, p. 618 (Japan); Jord. Tan. & Snyder, Cat. Fish. Japan, p. 418, 1913 (Enoshima).

FAMILY GADIDAE.

Merluccius, Rafinesque.

Merluccius, Rafinesque, Caratteri di alcuni nuovi generi, p. 26, 1810; Jord. & Everm. Fish. N. and Mid. Amer. p. 2529, 1898.

Onus, Rafinesque, Indice d'Ittiol. Siciliana, p. 12, 1810 (substitute for *Merluccius*).

Merlangus, Rafinesque l.c. p. 30, 1810 (substitute for *Onus*).

Merlus, Guichenot, in Gay, Hist. Nat. Chile, Zool. ii, p. 328, 1847.

Stomodon, Mitchill, Rept. Fish. New York 1814, p. 7.

Homalopomus, Girard, Proc. Acad. Nat. Sci. Philad. 1856, p. 132.

Epicopus, Günth. Cat. Fish. ii, p. 248, 1860.

Merluccius capensis, Cast.

(*Stok-visch*; *Hake*.)

Gadus merluccius, Pappe, Synops. Ed. Fish. C. G. Hope, p. 30, 1853, and 2nd ed. p. 21, 1866 (**Cape of Good Hope**; "utterly unknown . . . before the earthquake of 1809 (4th December). At first it was scarce and sold at exorbitant prices (4s. 6d.) . . . now a standard fish on the market, being caught in great abundance").

Merluccius vulgaris, Blkr. Visch. v. d. Kaap, p. 54, Name only, 1860 (**S. Africa**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 143 (**S. Africa**).

Merluccius capensis, Cast. Mem. Poiss. Afr. Austr. p. 68, 1860 (**Cape of Good Hope**; occasionally appears in great shoals, especially in winter); Regan, Ann. Natal Govt. Mus. i, pt. 1, 1906, p. 4 (**Cape of Good Hope**; Natal; "very distinct from *M. vulgaris*, with which it has been confounded"), and in Col. Fish. Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 243 (Bird Island).

Tripterophycis, Blgr.

Bouleng. Ann. & Mag. Nat. Hist. series 7, vol. ix, 1902, p. 335.

Tripterophycis gilchristi, Blgr.

Bouleng. Ann. & Mag. Nat. Hist. (7) ix, 1902, p. 335 and fig., and Mar. Inv. S. Afr. ii, 1904, p. 168 (40 miles off **Table Mountain**, 250 fms.).

Laemonema, Günth.

Phycis sp., Lowe, Fishes of Madeira, 1843 (1861).

Laemonema, Günth. Cat. Fish. iv, p. 356, 1862; Jord. & Everm. Fish. N. and Mid. Amer. p. 2556, 1898.

Laemonema globiceps, Gilchr.

Gilchr. Mar. Inv. S. Afr. iv, p. 157, 1908 (off **Cape Point**, 32-38 fms. and 460-800 fms.).

Laemonemodes, Gilchr.

Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 208.

Laemonemodes compressicauda, Gilchr.

Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 208 (East coast Africa, 15 miles off **Bashee River**, 300-400 fms.).

Barathronus, Goode & Bean.

Goode & Bean, Bull. Mus. Comp. Zool. xii, No. 5, 1883, p. 164 ; Jord. & Everm. Fish. N. and Mid. Amer. p. 2524, 1898.

Barathronus bicolor, Goode & Bean.

Goode & Bean, Bull. Mus. Comp. Zool. xii, No. 5, 1883, p. 164, and Ocean. Ichth. p. 341, fig. 298, 1896 (off Guadalupe, 769 fms.) ; Jord. & Everm. Fish. N. and Mid. Amer. p. 2524, 1898 (*Ibid*) ; Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 158 (36½ m. off **Cape Point**, 660 fms.).

Porogadus, Goode & Bean.

Goode & Bean, Proc. U.S. Nat. Mus. viii, 1885, p. 602 ; Jord. and Everm. Fish. N. and Mid. Amer. p. 2519, 1898.

Porogadus miles, Goode & Bean.

Goode & Bean, Proc. U.S. Nat. Mus. viii, 1885, p. 602, and Ocean. Ichth. p. 334, fig. 292, 1896 (Lat. 38.27 N., Long. 73.02 W., 1168 fms.) ; Günth. *Challenger*, Deep-sea Fish. xxii, p. 113, 1887 (*Ibid*) ; Jord. & Everm. Fish. N. and Mid. Amer. p. 2520, 1898 (*Ibid*) ; Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 159 (36 miles off **Cape Point**, 700-800 fms.).

Gaidropsarus, Rafinesque.

Gaidropsarus, Rafinesque, Indice d'Ittiol. Siciliana, p. 51, 1810 (description from a rough figure of Rondelet) ; Jord. & Everm. Fish. N. and Mid. Amer. p. 2558, 1898.

Les Musteles, Cuv. Règne Anim. ed. 1, vol. ii, p. 215, 1817.

♂ *Mustela*, Oken, Isis, 1817 (for *Les Musteles*, not *Mustela* a genus of mammals).

Onos, Risso, Eur. Mérid. iii, p. 214, 1826.

Mustela, Stark, Elem. Nat. Hist. i, p. 425, 1828 (after *Les Musteles*).

Motella, Cuv. Règne Anim. ed. 2, vol. ii, p. 334, 1829 ; Günth. Cat. Fish. iv, p. 364, 1862.

Onus, Günth. (corrected spelling).

Gaidropsarus capensis, Kaup.

Motella capensis, Kaup, Wieg. Arch. 1858, p. 90, taf. xiii, fig. 3 (**Cape**); Gilchr. Cat. Fish. 1902, in Mar. Inv. S. Afr. i, p. 143 (**South Africa**).

? *Motella capensis*, Kner, Novara, Fische, p. 279, 1865 (**Cape**).

? *Motella maculata*, Günth. Cat. Fish. iv, p. 366, 1862 (Coasts of Europe).

Algoa, Cast.

Castelnau, Mem. Poiss. de l'Afrique Austr. p. 69, 1861.

Algoa viridis, Cast.

Casteln. Mem. p. 69, 1861 (taken at mouth of **Zwartkops River, Algoa Bay**, in January); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 144 (**South Africa**).

SUB-ORDER **Acanthopterygii**.DIVISION **Perciformes**.FAMILY **BERYCIDAE**.**Plectromus**, Gill.

Gill, Proc. U.S. Nat. Mus. 1883, p. 257; Jord. & Everm. Fish. N. and Mid. Amer. p. 840, 1896.

Plectromus macrophthalmus, Gilchr.

Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 205, pl. xiii, fig. 2 (off **Cape Point Lighthouse**, 360 fms.).

Trachichthodes, Gilchr.

Trachichthodes, Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 203.

Austroberyx, McCulloch, Rec. Austr. Mus. Sydney, IX., No. 3, 1913, p. 358.

Trachichthodes spinosus, Gilchr.

Gilchr. Mar. Inv. S. Afr. ii, 1904, p. 204, pl. xiii, fig. 1 (Off **Cape Morgan, Transkei** 45 fms.).

Holocentrum, (Artedi), Scopoli.

Holocentrum, Artedi, Seba iii, tab. 27, fig. 1, about 1738 (*non-binomial*); Cuv. & Val. Hist. Nat. Poiss. iii, p. 182, 1829; Günth. Cat. Fish. i, p. 28, 1859.

Holocentrus, Gronov. Zoophyl. p. 65, 1763 (*non-binomial*); Bl. Ichth. iv, p. 61, 1790; Jord. & Everm. Fish. N. and Mid. Amer. p. 847, 1896.

Holocenthrus, (Gronov.) Scopoli, Int. Hist. Nat. 1777, p. 449 (Misprint for *Holocentrus*).

Corniger, Agassiz, in Spix, Pisc. Brasil. p. 121, 1831.

Rhynchichthys, Cuv. & Val. vii, p. 503, 1831.

Rhinoberyx, Gill, Proc. Ac. Nat. Sc. Philad. 1862, p. 237.

Holocentrum, of authors generally.

***Holocentrum sammara*, Forsk.**

Sciaena sammara, Forsk. Descr. Anim. p. 48, 1775; Lacep. Hist. Nat. Poiss. iv, p. 314, 1802 (Arabian Sea).

Perca sammara, Bl. Schn. Syst. Ichth. p. 89, 1801.

Labrus angulosus, Lacep. t.c. iii, p. 430, tab. xxii, fig. 1, 1802 (Indian Ocean; Pacific Ocean between New Holland and America).

Holocentrus sammara, Rüpp. Atl. Fische, p. 85, tab. xxii, fig. 3, 1828; Seale, Bishop Mus. iv, No. 1, 1906, p. 24 (Tahiti); Jord. & Seale, Fish. Samoa, p. 227, 1906 (Very common on reefs at Samoa; rare about Tahiti; Hawaii; Borabora; Paumotu Islds.; Solomon Islds.; Guam; New Guinea; Thornton Isld.; Marquesas Islds.; East Indies); Jord. & Snyder. Fish. Hawaii, p. 208, 1907; Jord. & Rich. Fish. Philippine Arch. p. 248, 1908 (Cagayan-cillo); Jord. Tan. & Snyder. Cat. Fish. Japan, p. 116, 1913 (Hawaii, Tahiti; Samoa, etc.; Tanegashima; Satsuma).

Holocentrum sammara, Cuv. & Val. iii, p. 216, 1829 (Indian Seas); Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 53 (Malayo-Moluccan Archipelago), Nat. Tijds. Ned. Ind. iii, 1852 (Amboyna), and Ned. Tijds. Dierk. iv, 1873, Revis. Holoc. p. 16 (Indian Archipelago); Günth. Cat. Fish. i, p. 46, 1859 (**Cape Seas**; Red Sea; India; Amboyna); Kner, Novara, Fische, p. 9, 1865; Playfair, Fish. Zanzibar, p. 52, 1866 (Island of Johanna); Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 720; Day, Fish. Ind. p. 173, 1876 (Red Sea; East coast Africa; seas of India to Malay Archipelago and beyond); Grandid. Madagascar, Poiss. p. 31, 1891; Jatzow & Lenz. Fische, Ost-Afr. Madag. Aldab. p. 498, 1898 (Zanzibar); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 121 (**South Africa**).

Holocentrum christianum, (Ehrenberg) Cuv. & Val. t.c.p. 219 (Red Sea).

Holocentrum loeve, Günth. t.c. p. 47 (Lousiade Archipelago; Solomon Islds.; Amboyna).

Holocentrum tahiticum, Kner, t.c. p. 9, t. 1, fig. 2 (Tahiti), and Sitz. Ak. Wiss. Wien. 1864, p. 482 (Tahiti).

Holocentrus fuscostriatus, Seale, Bishop Mus. 1901, p. 69 (Guam).

Holocentrus thorntonensis, Fowler, Proc. Ac. Nat. Sc. Philad. 1904, p. 231 (Thornton Isld.), Young.

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FAMILY **MONOCENTRIDAE.****Monocentris**, Bl. Schn.

- Gasterosteus* sp., Houttuyn, Act. Soc. Haarlem, xx, 1782.
Sciaena, sp., Thunberg, Nov. Act. Scient. Suec. xi, 1790.
Monocentris, Bl. Schn. Syst. Ichth. p. 100, 1801; Günth. Cat. Fish. i, p. 8, 1859.
Lepisacanthus, Lacép. Hist. Nat. Poiss. iii, p. 321, 1802.

Monocentris japonicus, Houttuyn.

- Gasterosteus japonicus*, Houtt. Act. Soc. Haarl. xx, pt. 2, 1782, p. 329 (Nagasaki).
Sciaena cataphracta, Thunb. Nov. Act. Sc. Suec. xi, 1790, p. 102, tab. 3 (Nagasaki).
Monocentris carinata, Bl. Schn. Syst. Ichth. p. 100, tab. 24, 1801 (Japan), copied, called *M. cataphracta* on plate.
Lepisacanthus japonicus, Lacép. Hist. Nat. Poiss. iii, p. 321, 1802, after Houttuyn.
Monocentris japonicus, Cuv. & Val. iv, p. 461, pl. 97, 1829 (Japan); Schleg. Faun. Japon. Poiss. p. 50, pl. 22, fig. 1, 1843 (Nagasaki); Günth. Cat. Fish. i, p. 9, 1859 (Japan; China Seas); Steindr. Fische Japans, i, 1883, p. 9 (Enoshima; Nagasaki; Kanagawa; Philippines); Jord. & Fowler, Proc. U.S. Nat. Mus. xxvi, 1903, p. 19 (Rather common in clear waters with rocky bottom off the coast of Japan); Jord. & Starks, Bull. U.S. Fish. Comm. 1902 (1904) p. 583 (Suruga Bay; Owari Bay, 42 fms.); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 148 (**Mossel Bay**, 20-36 fms.; off **Fish Point Lighthouse**, 35 fms.); Jord. Tan. & Synd. Cat. Fish. Japan, p. 118, 1913 (Tokyo to Nagasaki; Philippines).
Monocentris cataphracta, Blkr. Kon. Akad. Wet. 1853, p. 5 (Nagasaki), and Verh. Akad. Amsterd. i, 1854, p. 5 (Japan).
Osteology, Starks, Proc. U.S. Nat. Mus. xxvii, 1904, p. 617.

FAMILY **KUHLIIDAE.****Kuhlia**, Gill.

- Dules*, part., Cuv. & Val. iii, p. 111, 1829; Günth. Cat. Fish. i, p. 266, 1859.
Kuhlia, Gill, Proc. Ac. Nat. Sc. Philad. 1861, p. 48; Jord. & Everm. Bull. U.S. Fish. Comm. viii, 1888, p. 418; Bouleng. Cat. Perc. Fish. p. 35, 1895; Jord. & Everm. Fish. N. and Mid. Amer. p. 1013, 1896; Bouleng. Freshw. Fish. Africa, iii, p. 92, 1915.
Moronopsis, Gill, t.c. 1863, p. 82; Bleeker, Arch. Neerl. Sc. Nat. vii, 1872, p. 373, and Atlas Ichth. vii, p. 119, 1876.

- Paradules*, Bleeker, Ned. Tijds. Dierk. i, p. 257, 1863.
Boulengerina (non Dollo), Fowler, Proc. Ac. Nat. Sc. Philad. lviii, 1906, p. 512.
Safole, Jordan, Proc. U.S. Nat. Mus. xlii, 1912, p. 655.

Kuhlia malo, C. & V.

- Dules malo*, Cuv. & Val. vii, p. 479, 1831 (Otaheite); Günth. Cat. Fish. i, p. 270, 1859 (River Matavai, Otaheite).
Dules mato, Lesson, Voy. *Coquille*, Zool. ii, p. 223, 1836; Fowler, Proc. Ac. Nat. Sc. Philad. lviii, 1906, p. 512.
Dules lenciscus, Jenyns, Zool. *Beagle*, Fish. p. 17, 1842.
Dules marginatus, part., Günth. Fische Südsee, p. 24, 1873 (Sumatra; Java; Amboyna; Fiji; Society Islds.; Bonham, Gilbert & Hawaiian Islds.), and *Challenger*, Shore Fishes, p. 59, 1880 (Hilo; Honolulu).
Moronopsis argenteus var. sandvicensis, Steindr. Sitz. Ak. Wiss. Wien, lxxiv, i, 1876, p. 205 (Sandwich Islds.).
Dules humilis, De Vis, Proc. Linn. Soc. N.S. Wales, ix, 1884, p. 396 (Queensland, Australia).
Moronopsis sandvicensis, Steindr. Sitz. Ak. Wiss. Wien, xcvi, 1887, p. 56, pl. i, fig. 1.
Kuhlia malo, Bouleng. Cat. Perc. Fish. i, p. 40, 1895 (**South Africa**; Mauritius; Rodriguez; Fiji Islds.; Viti Levu; Tahiti; Sandwich Islds.; Hilo, Hawaii); and Freshw. Fish. Africa, iii, p. 96, 1915 (Rodriguez, fresh water; Mauritius; **S. Africa**); Steindr. Denkschr. Ak. Wien, lxx, 1900, p. 483; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. 1902, p. 105 (**S. Africa**); Jord. & Everm. Bull. U.S. Fish. Comm. xxiii, 1905, p. 207 (Hawaiian Islds.; common in the streams and brackish waters on the islands of Oahu and Hawaii); Jord. & Seale, Fish. Samoa, p. 255, 1906 (Hawaii; Tahiti; Tubuai; Paumotu Islds.); Fiji; Rodriguez; Laysan); Seale, Occ. papers Bishop Mus. iv, pt. 1, 1906, p. 34 (Tubuai; Austral Islds.; Tahiti; Makatea, Paumotu Islds.).
Dules marginatus boninensis, Fowler, t.c.p. 510, fig.
Kuhlia humilis, Douglas Ogilby, Ann. Queensland Mus. x, 1911, p. 46. pl. vi, fig. 1; Regan, Proc. Zool. Soc. 1913., p. 380, fig.
Kuhlia proxima, Kendall & Goldsbor. Mem. Mus. Comp. Zool. xxvi, 1911, p. 282, pl. iii, fig. 2.
Kuhlia sandvicensis, Kendall & Radcl. Mem. Mus. Comp. Zool. xxxv, 1912, p. 106; Regan, t.c.p. 381.
Kuhlia splendens, Regan, t.c.p. 379, fig.
 [C.P. 3—1916.]

Kuhlia taeniura, C. & V.

- Dules taeniurus*, Cuv. & Val. iii, p. 114, 1829 (Java); Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 49 (Malayo-Molucca Archipelago); Günth. Cat. Fish. i, p. 267, 1859 (Chinese & Javanese Seas); Kner, *Novara*, Fische, p. 47, 1865; Jatzow & Lenz, Fische Ost-Afr. Madag. Aldab. p. 500, 1898 (Zanzibar).
- Perca argentea*, Bennett, Fish. Ceylon, pl. xxii, 1830.
- Dules bennetti*, Blkr. Verh. Bat. Gen. xxv, 1853, p. 36 (Bengal); Peters, Mon. Berlin Ac. 1855, p. 432 (Mossambique); Günth. t.c.p. 270 (Sea of Ceylon; fresh waters of Mossambique); Jatzow & Lenz, t.c.p. 500 (Zanzibar; Bawi-Klippen; Majunga, etc.).
- Dules argenteus*, Klunz. Verh. Zool-bot. Ges. Wien xx, 1870, p. 62; Günth. Fische Südsee, p. 25, pl. xix, fig. 3, 1873; Day, Fish. Ind. p. 67, pl. xviii, fig. 2, 1875 (East coast Africa; seas of India to Malay Archipelago and beyond), and Faun. Ind. Fish. i, p. 504, 1889; Waite, Proc. Linn. Soc. N.S. Wales (2) ix, 1894, p. 217; Pfeffer, Ost-Afr. Fische, p. 5, 1903 (Zanzibar, Baui).
- Moronopsis taeniurus*, Blkr. Arch. Neerl. Soc. Nat. vii, 1872, p. 374 (Java; Sumatra), and Atlas Ichth. vii, p. 119, pl. ccclv, fig. 5, 1876 (Java; Sumatra; Buro).
- Paradules taeniurus*, Blkr. Ned. Tijds. Dierk. iv, 1873, p. 139 (China).
- Moronopsis argenteus*, Klunz. Fische Roth. Meer. p. 25, 1884.
- Kuhlia arge*, Jord. & Bollm. Proc. U.S. Nat. Mus. xii, 1889, p. 159 (Chatham Isld., Galapagos Archipelago); Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 419 (Galapagos Islds.; Revillagigedos).
- Kuhlia taeniura*, Jord. & Bollm. l.c., Bouleng. Cat. Perc. Fish. i, p. 39, 1895 (**South Africa**; Port Natal; Zanzibar; Socotra; Seychelles; Mauritius; Laccadives; China; Tahiti) and Freshw. Fish. Afr. iii, p. 96, 1915 (**S. Africa**; Port Natal; Zanzibar; Mombasa; Socotra; Seychelles; Mauritius); Steindr. Fische Süd-arab. and Sokotra, p. 5, 1902 (Sokotra); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 105 (**South Africa**); Jord. & Everm. Bull. U.S. Fish. Comm. xxiii, 1905, p. 202, fig. 81 (Johnston Isld.; common among lava rocks in the South Seas. Common at Samoa); Jord. & Seale, Fish. Samoa, p. 255, 1906 Samoa; Johnston Isld.; Marcus Isld.; Tubuai; Paumotu Islds.; Tahiti; East Indies; Galapagos Islds.; frequents "iron-bound" or lava coast in rather deep water); Seale, Bishop Mus. iv, pt. 1, 1906, p. 34 (Faté, New Hebrides); Regan, Trans. Linn. Soc. 2nd series, Zool. xii, pt. 3, 1908, p. 228 (Seychelles group, Praslin) and Proc. Zool. Soc. 1913, p. 381; Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 2,

- 1908, p. 149 (Natal); Bouleng. Freshw. Fish. Africa, iii, p. 95, 1915 (**South Africa** ?; Natal; Zanzibar; Mombasa; Socotra; Seychelles; Mauritius).
Kuhlia sterneckii, Steindr. Sitzb. Ak. Wien, cvii, i, 1898, p. 461. pl. —
Safole taeniura, Jord. Tan. & Snyder. Cat. Fish. Japan, p. 146, 1913 (Samoa, etc.; Misaki; Sagami; Tanegashima; Satsuma).

FAMILY CYPHOSIDAE.

Cyphosus, Lacép.

- Kyphosus*, Lacép. Hist. Nat. Poiss. iii, p. 114, 1802; Jord. & Fesler, Sparoid Fish. Rep. U.S. Comm. Fish. & Fisheries, 1889-1891 (1893), p. 533; Jord. & Everm. Fish. N. and Mid. Amer. p. 1384, 1898.
Pimclepterus, Lacép. t.c. iv, p. 429, 1802; Cuv. & Val. Hist. Nat. Poiss. vii, p. 254, 1831; Günth. Cat. Fish. i, p. 497, 1859.
Dorsuarius, Lacép. t.c.v, p. 482, 1803.
Xyster, Lacép. t.c. v, p. 484, 1803.
Saleima, Bowditch, Excursion, Madeira, p. 238, 1825.
 ? *Opisthistius*, Gill. Proc. Ac. Nat. Sc. Philad. 1862, p. 245.
Cyphosus, corrected spelling.

Cyphosus fuscus, Lacép.

- Xyster fuscus*, (Commers.) Lacép. Hist. Nat. Poiss. v, pp. 484 & 485, 1803 (Red Sea).
Pimclepterus fuscus, Cuv. & Val. vii, p. 264, 1831 (**Cape of Good Hope**); Rüpp. N.W. Fische, p. 34, taf. 10, fig. 3, 1838; Pappe, Synops. Ed. Fish. C. G. Hope p. 23, 1853, and 2nd ed. p. 16, 1866 (*Bastard Jacob Evertsen* caught chiefly in **Simons Bay** and along the **East Coast**); Günth. Cat. Fish. i, p. 498, 1859 (**Cape of Good Hope**; Red Sea) and *Challenger*, Deep Sea Fishes, vol. xxi, 1887 (A young specimen captured South of the **Cape of Good Hope** in Lat. 35° 4' S., Long. 18° 37' E.); Blkr. Visch. v. d. Kaap, p. 53, Name only, 1860 (**S. Africa**); Cast. Mem. Poiss. Afr. Austr. p. 34, 1861 (*Jacob Piver*. East coast, chiefly **Simons Bay**); Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 796; Day, Fish. Ind. p. 143, 1875 (Red Sea; seas of India to Malay Archipelago & beyond); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 116 (**South Africa**).
Pimclepterus waigiensis, Day t.c.p. 788, 1888 (Red Sea; seas of India to Malay Archipelago and beyond).
Cyphosus fuscus, Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 2, 1908, p. 174 (Natal); Regan, Col. Fish. in Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 245 (Kosi Bay).
Kyphosus fuscus, Jord. & Everm. Fish. Hawaiian Islds. in Bull. U.S. Fish. Comm. xxiii, pt. i, 1903 (1905) p. 248 (Honolulu); Jord. & Seale, Fish. Samoa, p. 271, 1906 (Hawaii; New Hebrides; East Indies).

FAMILY **SERRANIDAE.**SUB-FAMILY **SERRANINAE.****Acanthistius**, Gill.

Plectropoma, part., Cuv. & Val. Hist. Nat. Poiss. ii, p. 387, 1828; Günth. Cat. Fish. i, p. 156, 1859; Vaill. Miss. Sc. Mex. Poiss. p. 94, 1877.

Acanthistius, Gill, Proc. Ac. Nat. Sc. Philad. 1862, p. 236; Blkr. Arch. Neerl. xi, 1876, p. 256; Jord. & Eigenm. Bull. U.S. Fish Comm. viii, 1890, p. 347; Bouleng. Cat. Perc. Fish. i, p. 139, 1895.

Acanthistius seabastoides, Cast.

(*Rock-cod.*)

Serranus cuvieri (non Smith), Pappe, Synops. Ed. Fish. C. G. Hope, 1853, and 2nd ed. p. 23, 1866 (East coast Africa, particularly **Algoa Bay**); Cast. Mem. Poiss. Afr. Austr. p. 2, 1861 (**Algoa Bay**).

Plectropoma brasilianum (non Cuv. & Val.), Günth. Cat. Fish. i, p. 164, 1859 (Coast of Brazil).

Serranus seabastoides, Cast. t.c.p. 3 (**Algoa Bay**; **Simons Bay**).

Plectropoma seabastoides, Steindr. Ichth. Beiträge x, 1881, p. 23, tab. 1, and Sitz. Ak. Wiss. Wien, lxxxiii, 1881, p. 201, pl. i (**Table Bay**).

Acanthistius seabastoides, Bouleng. Cat. Perc. Fish. i, p. 141, 1895 (**Cape Seas**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 105 (**South Africa**).

Polyprion, Cuv.

Polyprion, Cuvier, Règne Anim. ii, p. 282, 1817, and in Valenciennes, Mem. du Mus. xi, p. 265, 1824; Cuv. & Val. Hist. Nat. Poiss. iii, p. 21, 1829; Günth. Cat. Fish. i, p. 168, 1859; Bleeker, Arch. Neerl. xi, 1876, p. 253; Jord. & Gilbert, Synops. p. 532, 1883; Jord. & Eigenm. Bull. U.S. Fish Comm. viii, 1890, p. 341; Bouleng. Cat. Perc. Fish. i, p. 148, 1895; Jord. & Everm. Fish. N. and Mid. Amer. p. 1138, 1896.

Hectoria, Castelnau, Notes Ed. Fish. Victoria p. 8, 1873, and Proc. Zool. Soc. Victoria, ii, 1873, p. 151.

Polyprion americanum, Bl. Schn.

(*Bafaro.*)

Le Merou de Cap Breton, Duhamel, Pesches, p. 38, 1769.

Amphiprion americanus, Bl. Schn. Syst. Ichth. p. 205, tab. 47, 1801.

Amphiprion australe, Bl. Schn. t.c. pl. xlvii.

- Scorpaena massiliensis*, Risso, Ichth. Nice, p. 184, 1810 (Marseilles), not Lacép.
- Sciaena aquila*, Rosenthal, Ichthyot. Tafeln, pl. 16, fig. 1, 1822.
- Polyprion cernium*, Valenc. Mem. Mus. xi, 1824, p. 265, pl. xvii (France); Cuv. & Val. iii, p. 21, pl. xlii, 1829 (France; Italy), and viii, p. 475, 1831 (South of Rio de la Plata); Swainson, Fishes, ii, p. 203, 1839; Yarrell, British Fish. 2nd ed. i, p. 19, figs., 1841; Düben & Koren, Vetensk. Ak. Handl. Copenh. xlv, 1844, p. 29; Nilss. Skand. Faun. Fisk. p. 33, 1855; Günth. Cat. Fish. i, p. 169, 1859 (Plymouth; Mediterranean; Madeira); Lowe, Fish. Madeira, p. 183, 1860; Couch, British Fish. i, p. 200, pl. xlv, 1862; Steindr. Sitz. Ak. Wien, lvi, i, 1867, p. 617; Canestr. Faun. Ital. Pesci, p. 78, 1874; Moreau, Poiss. France, ii, p. 349 and fig., 1881; Lilljeb. Sver. Norg. Fisk. p. 71, 1881; Day, Fish. Grt. Brit. & Ireland, p. 17, pl. vi, 1884; Emery, Mitth. Zool. Stat. Neap. vi, 1885, p. 155, pl. x, fig. 14; Döderl. Man. Ittiol. Medit. iv, p. 88, 1889; Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 342 (Southern Europe, north to Norway and south to **Cape of Good Hope**; once taken in the Gulf Stream off United States coast).
- Holocentrus gulo*, Risso, Eur. Mérid. iii, p. 367, 1826 (Nice).
- Serranus couchii*, Yarrell, British Fish. ed. i, p. 12 and fig. 1836 (Great Britain).
- Stone-basse*, Couch, Linn. Trans. xiv, p. 81.
- Polyprion americanum*, Costa, Faun. Nap. Pesci, i, 1850; Smitt, Skand. Fish. i, p. 47 and fig. 1893; Goode & Bean, Ocean. Ichth. p. 238, pl. lxvi, fig. 238, 1896 (Grand Banks, Newfoundland); Gilchr. Mar. Inv. S. Afr. iv, 1908, p. 145 (**Mossel Bay**, 30-35 fms.).
- Polyprion massiliense*, Costa, t.c. pl. i.
- Polyprion oxygenius*, Jord. & Gilbert, Synops, p. 532 (Deep water off coast of U.S., America), 1883 (not *Epinephelus oxygeneios*, Bl. Schn., which is the New Zealand species).
- Polyprion americanus*, Jordan, Cat. Fish. N. Amer. p. 83, 1885; Jord. & Everm. Fish. N. and Mid. Amer. p. 1139, 1896 (Coasts of Europe in deep water, 300 fms. or more; a single specimen from deep waters of Gulf Stream); Bouleng. Cat. Perc. Fish. i, p. 148, 1895 (British coast; Mediterranean; Madeira).

Polyprion prognathus, Forst.

- Epinephelus oxygeneios*, Bl. Schn. Syst. Ichth. p. 301, 1801 (Queen Charlotte's Isld., near New Zealand).
- Perca prognatha*, Forster in Bl. Schn. t.c., and in Descr. Anim. ed. Licht. p. 309, 1844 (Queen Charlotte's Isld.).
- [C.P. 3—1916.]

- Polyprion cernium*, Cuv. & Val. iii, p. 21, pl. 42, 1829 (**Cape of Good Hope**); Richards. in Dieffenb. New Zealand, ii, p. 206, 1843; Kner, *Novara*, Fische, p. 28, 1865; Sauvage, Arch. Zool. Expér. viii, 1880, p. 12 (St. Paul Isld.).
- Perca fernandeziana*, Gay, Hist. Chile, Zool. ii, p. 369, 1848.
- Centropristis gigas*, Owen, Osteol. Cat. Coll. Surg. i, p. 51, 1853 (Skeleton).
- Oligoras gigas*, Günth. Cat. Fish. i, p. 251, 1859 (New Zealand); Hutton, Fish. New Zealand, p. 1, 1872; Hector, op. cit. p. 102, pl. 1, fig. 1.
- Polyprion sp.*, Kner t.c.p. 28, 1865 (St. Paul Isld.).
- Oligoras gadoides*, Hutton Trans. New Zealand Inst. v, 1872, p. 259.
- Hectoria gigas*, Casteln. Notes Ed. Fish. Victoria p. 8, 1873.
- Polyprion Knerii*, Steindr. Sitz. Ak. Wiss. Wien, lxxi, i, 1875, p. 443 (Juan Fernandez); Günth. *Challenger*, Shore Fishes, p. 24, 1880 (Juan Fernandez).
- Polyprion prognathus*, Günth. Ann. & Mag. Nat. Hist. (5) xx, 1887, p. 236; Gill, Mem. Nat. Ac. Washington, vi, 1893, p. 96; Bouleng. Cat. Perc. Fish. i, p. 150, 1895 (Tasmania; New Zealand; Juan Fernandez); Waite, List Fish. New Zealand, p. 19, 1907.
- Polyprion oxygeneios*, Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 342 (South Pacific; coasts of South America & New Zealand); Delfin, Cat. Peces Chile p. 61, 1901 (Juan Fernandez).
- Polyprion americanum*, Goode & Bean, Ocean. Ichth. p. 238, pl. lxvi, fig. 238, 1896 (Grand banks, Newfoundland).

Epinephelus, Bloch.

- Epinephelus*, Bloch, Ausl. Fische, vii, p. 11, 1793; Bouleng. Cat. Perc. Fishes, i, p. 162, 1895, see synonymy; Jord. & Everm. Fish. N. and Mid. Amer. p. 1148, 1896.
- Serranus*, Cuv. & Val. ii, p. 210, 1828; Günth. Cat. Fish. i, p. 97, 1859.
- Cerna*, Bonap. Introd. alla Classi Pesci, Fauna Italica, iii, pt. 1, 1833; Döderlein, Revista, *Epinephelus* o *Cerna*, 1873.

Epinephelus ascensionis, Osb.

- Pira-pixanga* or *Gat-visch*, Marcgrave, Hist. Bras. p. 152, 1648 (Brazil), doubtful.
- Perca tota maculis*, Seba, Thesaurus, iii, tab. 27, 1738.
- Trachinus adscensionis*, Osbeck, Iter Chin. 1757, or English ed. p. 96, 1771 (Ascension Isld.); Cuv. & Val. vi, p. 517, 1830 (Ascension Isld.).
- Trachinus punctatus*, Bonnat. Tabl. Encycl. Meth. 1788, p. 46, after Osbeck.

- Perca stellio*, Walbaum, Artedi Piscium, p. 349, 1792, after Seba.
Perca maculata, Bl. Ausl. Fische, vi, p. 92, pl. cccxiii, 1792 (Martinique).
Trachinus Osbeck, Lacép. Hist. Nat. Poiss. ii, p. 364, 1800, after Osbeck (Ascension Isld. ; Atlantic Ocean).
Sparus atlanticus, Lacép. t.c. iv, p. 158, p'. v, fig. 1, 1802 (Atlantic Ocean ; Antilles).
Serranus nigriculus, Cuv. & Val. ii, p. 375, 1828 (Martinique).
Serranus trimaculatus, Cuv. & Val. ii, p. 331, 1828 (Japan) ; Schleg. Faun. Japon. Poiss. p. 8, 1842 ; Richards, Ichth. China, p. 232, 1846 ; Günth. Cat. Fish. i, p. 109, 1859 (**Cape Seas** ; China ; Japan).
Serranus pixanga, Cuv. & Val. ii, p. 383, 1828 (Brazil), after Marcgrave ; Poey, Repert. i, p. 203, 1866.
Serranus aspersus, Jenyns, Zool. Beagle, Fish. p. 6, 1842 (Porto Praya ; St. Jago of the Cape Verde Islds.).
Serranus impetiginosus, Mull. & Trosch. in Scomb. Hist. Barb. p. 665, 1848 (Barbadoes) ; Günth. Cat. Fish. i, p. 142, 1859 (Trinidad), and Challenger, Shore Fishes, p. 5, 1880 (Ascension Isld.) ; Steindr. Ichth. Beitr. v, 1876, p. 127 (Bahia ; Maranhao).
Serranus ura (non C. & V.), Günth. t.c.p. 147, 1859 (St. Helena).
Serranus capreolus, Poey, Mem. Cuba, ii, p. 145, 1860 (Cuba) ; Vaill. & Boc. Miss. Sc. Mexico, Poiss. p. 87, pl. iii, fig. 1, 1877 (Gulf of Mexico ; Brazil ; Ascension).
Serranus maculatus var. impetiginosus, Peters Mon. Berlin Ac. 1865, p. 110.
Epinephelus impetiginosus, Poey, Repert. Cuba, i, p. 201, 1866 and Synops. Pisc. Cubens. p. 286, 1868 (Cuba) ; Jord. & Gilbert, Synops. p. 973, 1883.
Serranus varius, Bocourt, Ann. Sc. & Nat. (5) x, 1868, p. 222 (Gulf coast of Mexico).
Epinephelus punctatus, Poey, Enum. p. 16, 1875 (Cuba), and Fauna, Puerto Riqueña, in Ann. Soc. Hist. Nat. Madrid, 1881, p. 319.
Epinephelus capreolus, Jord. & Gilbert, t.c.p. 539 (Key West).
Epinephelus atlanticus, Jord. & Gilbert, t.c.pp. 918, 973.
Serranus clathratus, (non Steindr.) Goode, Fish. & Fisher. Indust. U.S. i, pl. clxvi, 1884.
Epinephelus ascensionis, Jord. & Swain, Proc. U.S. Nat. Mus. vii, 1884, p. 391 (Cuba ; Key West) ; Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1890, p. 354 ; Bouleng. Cat. Perc. Fish. i, p. 228, 1895 (**Cape Seas** ; St. Helena ; Ascension ; Bahia ; Vera Cruz ; Caribbean Sea ; Trinidad ; West Indies ; Bermuda) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 106 (**South Africa**).
Epinephelus aspersus, Jord. & Eigenm. t.c.p. 358 (Cape Verde Islds.).
Epinephelus adscensionis, Jord. & Eigenm. t.c.p. 354 (West Indian fauna ; Florida Keys to Brazil ; Ascension and [C.P. 3—1916.]

St. Helena); Jord. & Everm. Fish. N. and Mid. Amer. p. 1153, 1896 (West Indies; Florida Keys to Brazil; Ascension and St. Helena Islds.; common in rocky places; widely distributed throughout the Western Atlantic); Everm. & Marsh, Fish. Porto Rico, in Bull. U.S. Fish Comm. xx, pt. 1, 1900, p. 152 (Ponce; Isabel Segunda; widely distributed throughout Western Atlantic from southern Florida to Brazil and is also known from Ascension and St. Helena Islds. and **Cape of Good Hope**).

Epinephelus guaza, Linn.

Labrus guaza, Linn. Syst. Nat. ed. x, p. 285, 1758 ("Habitat in Pelago").

Perca gigas, Brünn. Ichth. Massil. p. 65, no. 81, 1768 (Marseilles)

Holocentrus gigas, Bl. Schn. Syst. Ichth. p. 322, 1801; De la Roche, Ann. Mus. xiii, 1809, p. 318.

Holocentrus merou, Lacép. Hist. Nat. Poiss. iv, p. 377, 1802 (Marseilles), after Brünnich; Risso, Ichth. Nice, p. 289, 1810.

Serranus gigas, Geoff. Mem. Mus. xi, 1824, p. 443, pl. xxi; Risso, Eur. Mérid. iii, p. 373, 1827; Cuv. & Val. ii, p. 270, pl. xxxiii, 1828 (Mediterranean); Bory, Expéd. Morée, iii, Poiss. pl. xvi, fig. 1, 1832; Guichen. Explor. Sc. Algér. Poiss. p. 35, 1850; Günth. Cat. Fish. i, p. 132, 1859 (**Cape of Good Hope**; Madeira); Capello, Jorn. Sc. Lisbon, i, 1867, p. 244; Steindr. Ichth. Berichte, iv, 1867, p. 11 (Barcelona; Tangier; Lisbon; Teneriffe), Sitz. Ak. Wien. lxxiv, i, 1876, p. 175 (**Cape of Good Hope**), Ichth. Beitr. v, 1876, p. 127 (Canary Islds.; Madeira; Cape Verde; Brazil; **Cape of Good Hope**), and xii, 1882, p. 6; Canestr. Faun. Ital. Pesc. p. 76, 1874; Day, British Fish. p. 16, pl. v, 1884.

Serranus mentzelii, Cuv. & Val. t.c.p. 291 (Coast of Brazil); Günth. t.c.p. 140 (Coast of Brazil).

Serranus dichropterus, part, Cuv. & Val. t.c.p. 293 (Brazil).

Perca robusta, Couch, Mag. Nat. Hist. 1832, vi p. 21, fig. 7 (Polperro, Cornwall).

Serranus marginatus, (non Cuv. & Val.), Lowe, Proc. Zool. Soc. 1833, p. 142 (Madeira).

Serranus fimbriatus, Lowe, Trans. Camb. Phil. Soc. 1836, p. 195, pl. i (Madeira); Val. in Webb & Berthel. Iles Canaries, Poiss. p. 8, 1843; Capello, Jorn. Sc. Lisbon, i, 1867, p. 246.

Serranus gigas, part., Yarrell, British Fish. i, p. 15, fig., 1836; Günth. t.c.p. 132 (**Cape of Good Hope**; Madeira); Steindr. Sitz. Ak. Wien, lvi, i, 1867, p. 613; Day, Fish. Great Britain, p. 16, 1884.

Cerna gigas, Bonap. Icon. Faun. Ital. iii, Introd. 1841; Costa, Faun. Nap. p. i pl. vii bis, 1850; Döderl. Giorn. Sc. Palermo, xv, 1882, p. 177, pl. i, fig. 1, and Revista Epineph. o Cerna, 1882, p. 10, tab. i, fig. 1 (detailed description and synonymy).

Serranus ongun, part., Günth. t.c.p. 142, 1859 (not *Epinephelus ongun*, Bloch, a Japanese fish).

Epinephelus brachysomus, Cope, Trans. Am. Philos. Soc. (2) xiv, 1871, p. 466 (Rio Janeiro).

Epinephelus gigas, Moreau, Poiss. France, ii, p. 368, 1881; Jord. & Swain, Proc. U.S. Nat. Mus. vii, 1884, p. 388; Jord. & Eigenm. Bull. U.S. Fish Comm. viii, 1888, p. 359 (Eastern Atlantic; Mediterranean; coast of Brazil); Döderl. Man. Ittiol. Medit. iv, 1889, p. 61; Bouleng. Cat. Perc. Fish. i, p. 231, 1895 (**Cape of Good Hope**; Port Natal; Brazil; Bahia; Rio Janeiro; Cape Verde Islds.; Canary Islds.; Madeira; coast of Portugal); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**South Africa**); Steindr. Fische Sud-arab. Sokotra, p. 5, 1902 (Gischin); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 223 (Natal).

Epinephelus guaza, Jord. & Everm. Fish. N. and Mid. Amer. p. 1154, 1896 (Coasts of Southern Europe and Western Africa, ranging North to England and westwards to **Cape of Good Hope** and Rio Janeiro, and to Guiana).

Epinephelus lanceolatus, Bl.

Holocentrus lanceolatus, Bl. Ausl. Fische iv, p. 92, pl. cclxii, fig. 1, 1790; Russell, Fish. Vizagapatam, ii, p. 23, pl. cxxx, 1803; Shaw, Zool. iv, p. 567, 1803.

Serranus lanceolatus, Cuv. & Val. ii, p. 316, 1828 (Pondicherry); Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 35 (Malayo-Molucca Archipelago); Cantor, Cat. Malay. Fish. p. 8, 1849; Günth. Cat. Fish. i, p. 107, 1859 (Bay of Bengal; Batavia; Samarang); Day, Fish. Malabar, p. 4, pl. 1, 1865; Playf. Fish. Zanz. p. 4, 1866 (Zanzibar); Day, Fish. India, pp. 18 and 101, pl. iv, fig. 1, 1875 (East coast Africa; seas of India to Malay Archipelago and beyond), and Faun. India, Fish. i, p. 450, 1889.

Serranus geographicus, Cuv. & Val. t.c.p. 322 (Java seas); Günth. t.c.p. 150 (Java).

Serranus horridus (non Cuv. & Val.), Cantor, t.c.p. 9; Günth. t.c.p. 136 (Javanese Sea; Sea of Pinang).

Batrachus gigas, Günth. Ann. & Mag. Nat. Hist. (4) iii, 1869, p. 131; Ward, ibid, p. 352.

Epinephelus lanceolatus, Blkr. Verh. Ak. Amst. xiv, No. 2, 1874, p. 53, and Atlas Ichth. vii, p. 49, pl. cccxxxii, fig. 3, 1876 (Indian Archipelago); Bouleng. Cat. Perc. Fish. i, p. 251, 1895 (Port Natal; Mauritius; Zanzibar; Seychelles; Madras; Pinang; Singapore; West Africa?) Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**South Africa**); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 219 (Natal).

Epinephelus taeniops, Cuv. & Val.

- Serranus taeniops*, Cuv. & Val. ii, p. 370, 1828 (Cape Verde); Günth. Cat. Fish. i, p. 121, 1859 (St. Vincent; Atlantic; **South Africa**); Trosch. Archiv für Natur. 1866, p. 195; Steindr. Denkschr. Ak. Wien, xlv, 1881, p. 20, pl. 1, fig. 1, or Fische Afrikas, p. 4, pl. 1, 1881 "Very common on the coast of Senegambia to the Cape Verde Islds. and Guinea; rare on the coasts of the Bahama Islds. to Florida").
- Bodianus taeniops*, Jord. & Gilbert, Synops. p. 919, 1883; Jord. & Eigenm. Bull. U.S. Fish Comm. viii, 1880, p. 379 (West Indies and Florida Keys to West coast of tropical Africa); Jord. & Everm. Fish. N. and Mid. Amer. p. 1144, 1896 (West coast Africa, very common).
- Eunecentrus*, Jord. & Swain, Bull. U.S. Nat. Mus. vii, 1884, p. 402.
- Epinephelus taeniops*, Bou'eng. Cat. Perc. Fish. i, p. 186, 1895 (St. Vincent; Cape Verde Islds.; **S. Africa**, ? Atlantic); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 106 (**South Africa**).

Epinephelus tauvina, Forsk.

- Perca tauvina*, Forsk. Descr. Anim. p. 39, 1775 (Red Sea).
- Holocentrus malabaricus*, Bl. Schn. Syst. Ichth. p. 319, pl. lxiii, 1801.
- Holocentrus tauvina*, Bl. Schn. t.c.p. 321, 1801.
- Holocentrus salmoides*, Lacép. Hist. Nat. Poiss. iii, pl. xxxiv, fig. 3, and iv, p. 389, 1802 (Norway; North Sea between Greenland and Norway).
- Bola* (?) *coioides*, Ham. Buch. Fish. Ganges, p. 82, 1822.
- Epinephelus tauvina*, Russell, Fish. Vizagapatam, ii, pl. cxxvii & cxxviii, 1803; Blgr. Cat. Perc. Fish. i, p. 244, 1895 (Natal; Zanzibar; Muscat; Fao; Persian Gulf; Ceylon; Madras; Vizagapatam; Benga; Singapore; Malay Archipelago; Borneo; Formosa; Amoy; China; Ponape Caroline Islds.; N. Celebes; Amboyna; Pellew Islds.; Port Essington; Port Dension; Port Bowen; Java); Waite, Mem. Austr. Mus. iii, 1897, p. 182 (Funafuti Atoll, Ellice Group); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**S. Africa**); Jord. & Everm. Proc. U.S. Nat. Mus. xxv, 1903, p. 341 (Keerun; Formosa); Jord. & Seale, Fish. Samoa, p. 259, 1906 (Louiisiades; Ponape; Palau Islds.; East Indies), and Fish. Luzon & Panay, p. 20, 1907 (Cavite); Everm. & Seale, Fish. Philippine Islds. p. 75, 1907 (Bacon); Stead, Add. Fish-Fauna N.S. Wales, No. 1, 1907, p. 8, pl. ii (Macleay River); Regan, Col. Fish. in Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 244 (Congella), and Ann. Durban

- Mus. i, pt. 3, 1916, p. 167 (Durban, Natal); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 220 (Natal); Bamber, Journ. Linn. Soc. xxxi, 1915, Zool. No. 210, p. 480 (Red Sea, between Suez & Suakim).
- Serranus maculosus*, Cuv. & Val. ii, p. 332, 1828 (Locality unknown).
- Serranus bontoo*, Cuv. & Val. ii, p. 334, 1828 (Vizagapatam); Cantor, Cat. Malay. Fish. p. 11, 1849; Günth. Cat. Fish. i, p. 138, 1859 (Ceylon); Day, Fish. Malabar, p. 3, 1865.
- Serranus suillus*, Cuv. & Val. ii, p. 335, 1828 (Coromandel Coast); Blkr. Verh. Bat. Gen. xxii, 1849, p. 9 (Malayo-Molucca Archipelago); Günth. t.c.p. 127, 1859 (Philippines); Playf. Fish. Zanz. p. 5, 1866 (Zanzibar).
- Serranus semipunctatus*, Cuv. & Val. ii, p. 341, 1828 (Pondicherry); Günth. t.c.p. 114, 1859 (Coast of Pondicherry); Day, Fish. India, p. 20, 1875 (Pondicherry), and Faun. Ind. Fish. i, p. 452, 1889.
- Serranus salmonoides*, Cuv. & Val. ii, p. 343, 1828 (Isle de France; Seychelles; Red Sea); Günth. t.c.p. 128, 1859 (Red Sea; Ile de France; India); Klunz. Verh. Zool.-bot. Ges. Wien, xx, 1870, p. 682, and Fische Roth. Meer. p. 5, 1884; M. Web. Zool. Jahrb. x, pt. 2, 1897, p. 142 (Mouth of Illovo River, Natal).
- Serranus crapao*, Cuv. & Val. iii, p. 494, 1829 (Batavia); Richards. Ann. & Mag. Nat. Hist. ix, 1842, p. 25; Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 37 (Malayo-Molucca Archipelago); Günth. t.c.p. 137 (Port Essington).
- ? *Serranus diacopeformis*, Bennett, Life of Raffles, p. 686, 1830.
- Serranus schihpan, undulosus* (not C. & V. or Blkr.), *variegatus*, Richards, Rep. Ichth. China, pp. 231, 232, 1846.
- Serranus coioides*, Cantor, t.c.p. 11, 1849.
- Serranus polypodophilus*, Blkr. l.c.
- Serranus abdominalis*, Peters, Mon. Berlin Ac. 1855, p. 430.
- Serranus diacanthus*, part., Günth. t.c.p. 110, 1859 (India; China; Hongkong; Louisiade Archipelago, in 30 fms. and in 12 fms., sand).
- Serranus janseni*, Blkr. Nat. Tijds. Ned. Ind. xiii, 1857, p. 376 (Sangi Islds.).
- Serranus chabaudi*, Cast. Mem. Poiss. Afr. Austr. p. 3, 1861 (Mouth of **Zwartkops River, Algoa Bay**).
- Serranus tauvina*, Klunz. t.c. pp. 6, 683, pl. i, fig. 3, 1870.
- Epinephelus pantherinus*, Blkr. Verh. Ak. Amst. xiv, No. 2, 1873, p. 33, and Atlas Ichth. vii, p. 51, pl. cclxxxvi, fig. 1, 1876.
- Epinephelus polypodophilus*, Blkr. l.c. pp. 36, 59, pl. cclxxxiii, fig. 1.
- Epinephelus janseni*, Blkr. l.c. pp. 80, 51, pl. cclxxxix, fig. 5.
- Serranus malabaricus*, Day, Fish. Ind. p. 19, pl. iv, fig. 2, 1875 (Calcutta).

- Serranus salmoides*, Day, t.c. p. 20, pl. iv, fig. 3, 1875 (Andaman Islds. ; not common in India), and Faun. India, Fish. p. 452, 1889.
- ? *Homalogrystes güntheri*, Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales, i, 1876, p. 269, pl. vi, fig. 3.
- ? *Serranus estuarius*, Macleay, Proc. Linn. Soc. N.S. Wales, viii, 1883, p. 200.
- Serranus pantherinus*, Day, Faun. India, Fish. i, p. 451, 1889.
- Epinephelus malabaricus*, Sauvage, Hist. Madagascar, Poiss. p. 67, 1891.

Serranus, Cuv.

- Holocentrus, part.*, Bloch, Ausl. Fische, iv, p. 59, 1790.
- Serranus, part.*, Cuv. Règne Anim. 1st ed. ii, p. 276, 1817, and 2nd ed. p. 138, 1829 ; Cuv. & Val. ii, p. 210, 1828 ; Günth. Cat. Fish. i, p. 97, 1859 ; Vaill. & Boc. Miss. Sc. Mex. Poiss. p. 44, 1878 ; Jord. & Gilbert, Synops. p. 532, 1883.
- Plectropoma, part.*, Cuv. & Val. ii, p. 387, 1828 ; Günth. t.c.p. 156, 1859 ; Vaill. & Boc. t.c.p. 94, 1878.
- Centropristes, part.*, Cuv. & Val. iii, p. 36, 1829 ; Günth. t.c.p. 82, 1859 ; Poey, Ann. Lyc. New York, x, 1871, p. 51 ; Blkr. Arch. Néerl. xi, 1876, p. 254 ; Vaill. & Boc. t.c.p. 135, 1878.
- Dules, part.*, Cuv. & Val. iii, p. 111, 1829 ; Günth. t.c.p. 266, 1859.
- Prionodes*, Jenyns, Voy. *Beagle*, Fish. p. 46, 1842 ; Günth. t.c.p. 96, 1859.
- Diplectrum*, Holb. Ichth. S. Carol. p. 32, 1856 ; Canestr. Verh. Zool.-bot. Ges. Wien, x, 1860, p. 306 ; Poey, t.c.p. 54, 1871 ; Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 396.
- Paralabrax*, Girard, Proc. Ac. Philad. 1856, p. 131 ; Günth. t.c.p. 62, 1859 ; Vaill. & Boc. t.c.p. 67, 1878 ; Jord. & Eigenm. t.c.p. 386, 1888.
- Atractoperca*, Gill, Proc. Ac. Philad. 1861, p. 164.
- Haliperca*, Gill, Proc. Ac. Philad. 1862, p. 236 ; Poey, t.c.p. 52, 1871.
- Mentiperca*, Gill. l.c., Poey, l.c.p. 54, 1871.
- Hypoplectrus*, Gill. t.c.p. 237, 1862 ; Poey, t.c.p. 55, 1871 ; Jord. & Gilbert, t.c.p. 916, 1883 ; Jord. & Eigenm. t.c.p. 382, 1888.
- Pseudoserranus, part.*, Klunz. Verh. Zool.-bot. Ges. Wien, xx, 1870, p. 687, and Fische Roth. Meer. p. 6, 1884.
- Serranus*, Blkr. Verh. Akad. Amst. xiv, No. 2, 1874, p. 2, and Arch. Néerl. xi, 1876, p. 355 ; Jord. & Eigenm. t.c.p. 399, 1888 ; Bouleng. Cat. Perc. Fish. i, p. 274, 1895.
- Paraserranus*, Blkr. Verh. Akad. Amst. xiv, No. 2, 1874, p. 6, and Atlas Ichth. vii, p. 22, 1876.

- Dules*, Blkr. Arch. Néerl. xi, 1876, p. 254; Steindr. Sitzb. Ak. Wien, xcvi, 1888, i, p. 58; Jord. & Eigenm. t.c.p. 394, 1888.
- Hypoplectrus*, *part.*, Blkr. Arch. Néerl. xi, 1876, p. 255.
- Cratinus*, Steindr. Sitzb. Ak. Wien, lxxxviii, i, 1878, p. 395; Jord. & Eigenm. t.c.p. 393, 1888.
- Paracentropristes*, Klunz. Fische Roth. Meer. p. 16, 1884; Jord. & Eigenm. t.c.p. 393, 1888.
- Serranellus*, Jord. & Eigenm. t.c.p. 404, 1888.

Serranus cabrilla, Linn.

- Perca cabrilla*, Linn. Syst. Nat. 10th ed. i, p. 294, 1758, and 12th ed. i, p. 488, 1766.
- Holocentrus argentinus*, Bl. Ausl. Fische, iv, p. 73, pl. ccxxxv, fig. 2, 1790.
- Lutjanus serran*, Lacép. Hist. Nat. Poiss. iv, p. 205, 1802 (Mediterranean).
- Bodianus hiatula*, Lacép. t.c.p. 297 (Mediterranean).
- Holocentrus flavus*, Risso, Ichth. Nice, p. 293, 1810.
- Holocentrus serran*, Risso, t.c.p. 294.
- Serranus cabrilla*, Risso, Eur. Mérid. iii, p. 375, 1826; Cuv. & Val. ii, p. 223, pl. xxix, 1828 (Mediterranean; Algéciras; Teneriffe); Yarrell, British Fish. i, p. 9, fig., 1836; Nordm. in Demid. Voy. Russ. Mér. iii, p. 367, 1846; Costa, Faun. Nap. Pesc. 1850; Couch, British Fish. i, p. 195, pl. xlii, 1862; Peters, Mon. Berl'n Ac. 1865, p. 101; Canestr. Faun. Ital. Pesc. p. 75, 1874; Day, Fish. Grt. Britain, p. 14, pl. iv, 1880; Moreau, Poiss. France, ii, p. 360, 1881; Vincig. An. Mus. Genova, xviii, 1883, p. 491; Jord. & Eigenm. Bul. U.S. Fish Comm. viii, 1888, p. 411 (Mediterranean; Azores; coasts of Southern Europe & Northern Africa); Döderl. Man. Ittiol. Mediterraneo, iv, 1889, p. 45; Steindr. Sitz. Akad. Wien, c.i., 1891, p. 349; Osorio, Jorn. Sc. Lisbon, (2) ii, 1891, p. 99 (San Thomé); Bouleng. Cat. Perc. Fish. i, p. 283, 1895 (Great Britain; Channel Islds.; Lisbon; Gibraltar; Cannes; Dalmatia; Constantinople; Propontis; Mediterranean; Madeira); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**S. Africa**); Herdm. & Daw. Fish. Irish Sea, p. 33, 1902 (South & West coast of England to the Mediterranean; Madeira; **Cape of Good Hope**).

Serranus flavus, Risso, Eur. Mérid. iii, p. 376, 1826.

Perca channus, Couch, Mag. Nat. Hist. v, 1832, p. 19, fig. (Cornwall).

Perca mormyrus, Gronov. Syst. ed. Gray, p. 109, 1854 (Mediterranean).

Centropristis praestigiator, spec. *a*, *b* (non Poey), Günth. Cat. Fish. i, p. 85, 1859 (Cuba).

- Serranus cabrilla* (part.), Günth. t.c.p. 106 (Mediterranean ; Black Sea ; coasts of Portugal & France ; South coast of England ; Madeira ; Teneriffe ; St. Pauls ; W. Indies).
Pseudoserranus bicolor, Kossm. & Räub. Ergebn. Reise Roth. Meer. p. 7, pl. i, fig. 1, 1877 (Red Sea).
Pseudoserranus cabrilla, Klunz. Fische Roth. Meer. p. 7, pl. ii, figs. 4 & 5, 1884.

***Serranus hepatus*, Linn.**

- Labrus hepatus*, Linn. Syst. Nat. ed. xii, i, p. 474, 1766.
Labrus sp., Brännich, Spol. Mass. p. 98, 1768 (Adriatic).
Holocentrus striatus, Bl. Ausl. Fische, iv, p. 71, pl. cccxxv, fig. 1, 1790.
Labrus spalatensis, Bl. Schn. Syst. Ichth. p. 256, 1801.
Lutjanus adriaticus, Lacép. Hist. Nat. Poiss. iv, p. 222, 1802 (Adriatic).
Holocentrus triacanthus, Lacép. t.c.p. 377, 1802 (No locality stated).
Helocentrus siagonotus, Delaroche, Ann. Mus. xiii, 1809, p. 352, pl. xxii, fig. 8.
Holocentrus hepatus, Risso, Ichth. Nice, p. 292, 1810.
Serranus hepatus, Risso, Eur. Mérid. iii, p. 377, 1827 ; Cuv. & Val. ii, p. 231, 1828 (Mediterranean ; Adriatic) ; Bonap. Icon. Faun. Italica, Pesc. iii, 1832 ; Costa, Faun. Napoli, Pesc. pl. vii, 1850 ; Canestr. Faun. Ital. Pesc. p. 75, 1874 ; Moreau, Poiss. France, ii, p. 363, fig., 1881 ; Vincig. An. Mus. Genova, xviii, 1883, p. 489 ; Döderl. Man. Ittiol. Mediterraneo, iv, p. 50, 1889 ; Bouleng. Cat. Perc. Fish. i, p. 286, 1895 (Mediterranean ; Naples ; Dalmatia ; Constantinople) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**S. Africa**).
Holocentrus adriaticus, Nardo, Prodr. Adriat. Ichth. pp. 14 & 21, 1827 (Adriatic).
Centropristis hepatus, Günth. Cat. Fish. i, p. 84, 1859 (Mediterranean ; **Cape of Good Hope**).
Paracentropristis hepatus, Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 395 (Palermo ; Venice ; Mediterranean Sea).

***Serranus knysnaensis*, Gilchr.**

- Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 2, pl. xix (**Knysna**).

***Serranus novemcinctus*, Kner.**

- Serranus cabrilla*, part, Günth. Cat. Fish. i, p. 106, 1859 ; Steindr. Sitzb. Ak. Wien, lvi, i, 1867, p. 611.
Serranus novemcinctus, Kner, Novara, Fische, p. 17, pl. ii, fig. 1, 1865 ("**Capstadt**" ; St. Paul's Isld.) ; Vaill. Miss. Sc. Mexico, Poiss. p. 63, 1877 ; Sauvage, Arch. Zool. Expér. viii, 1880, p. 7 ; Bouleng. Cat. Perc. Fish. p. 284, 1895 (**Cape of Good Hope** ; St. Paul's Isld., Indian Ocean).

Lutianus, Bloch.

Lutianus, Bloch, Ichth. iv, p. 107, 1790; Jord. & Everm. Fish. N. and Mid. Amer. p. 1247, (foot-note) 1898 ("The name first spelled *Lutianus*, but later changed on the plates and elsewhere to *Lutjanus*. It is from *Ikan lutjang*, the Malayan name of *Lutianus lutianus*.").

Mesoprion, Cuv. Règne Anim. 1817; Cuv. & Val. Hist. Nat. Poiss. ii, p. 439, 1828; Günth. Cat. Fish. i, p. 184, 1859.

Diacope, Rüpp. Atlas Roth. Meer. p. 70, 1828; Cuv. & Val. t.c.p. 410, 1828 (name preoccupied in *Lepidoptera*).

Lutianus johnii, Bl.

Anthias johnii, Bl. Ichth. ix, p. 97, pl. cccxviii, 1797.

Lutianus johnii, Lacép. Hist. Nat. Poiss. iv, p. 235, 1802 (Tranquebar); Day, Fish. Ind. p. 42, pl. xiii, fig. 1, 1875 (Madras; seas of India to Malay Archipelago and beyond); Blkr. Atlas Ichth. viii, p. 49, pl. cccxxxviii, fig. 3, 1877; Jord. & Seale, Fish. Samoa, p. 264, 1906 (Tahiti; East Indies); Everm. & Seale, Fish. Philippine Islds. p. 79, 1907 (Jolo; Bacon; Bulan); Regan, Col. Fish. in Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 244 (Durban Bay); Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 3, 1909, p. 213 (Natal).

Sparus tranquebaricus, Shaw, Gen. Zool. iv, p. 471, 1803.

Sparus doondiawah, Russell, Fish. Vizagapatam, i, p. 76, pl. 97, 1803.

Coius catus, Ham. Buch. Fish. Garges, p. 90, pl. 38, fig. 30, 1822

Mesoprion immaculatus, Quoy & Gaim. Zool. Voy. *Uranie* and *Physicienne*, p. 303, 1824, and Voy. *Astrolabe*, Poiss. p. 665, pl. 5, fig. 3, 1834; Cuv. & Val. ii, p. 441, 1828 (Indian Ocean); Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 42 (Malayo-Molucca Archipelago).

Serranus pavonius, Cuv. & Val. vii, p. 443, 1828 (young; Bombay); Günth. Cat. Fish. i, p. 126, 1859 (Bombay).

Mesoprion johnii, Cuv. & Val. ii, p. 443, 1828 (India); Cantor, Cat. Malay. Fish. p. 13, 1849; Günth. Cat. Fish. i, p. 200, 1859 (**Cape Seas**; Indian Ocean; China Sea; Malay Archipelago; coast of Australia; Pacific); Day, Fish. Malabar, p. 11, 1865; Kner, *Novara*, Fische, p. 35, 1865; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 108 (**S. Africa**).

Mesoprion flavipinnis, Cuv. & Val. ii, p. 475, 1828 (Pondicherry).

SUB-FAMILY GRAMMISTINAE.

Rhypticus, Cuv.

Rypticus, Cuv. Règne Anim., 2nd ed., ii, p. 144, 1829; Cuv. & Val. Hist. Nat. Poiss. iii, p. 60, 1829; Jord. & Eigenm. Bull. U.S. Fish Comm. viii, 1888, p. 336; Jord. & Everm. Fish. N. and Mid. Amer. p. 1229, 1896.

[C.P. 3—1916.]

- Smeticus*, Valenc. in Voy. *Venus*, Zool. p. 305, 1855; Bleeker, Arch. Néerl. xi, 1876, p. 258.
Rhypticus (amended spelling), Günth. Cat. Fish. i, p. 171, 1859; Bleeker, t.c.p. 258, 1876; Jord. & Gilbert, Synops. p. 543, 1883; Bouleng. Cat. Perc. Fish. i, p. 347, 1895.
Promicropterus, Gil, Proc. Ac. Nat. Sc. Philad. 1861, p. 53.
Eleutheractis, Cope, Trans. Amer. Philos. Soc. xiv, 1870, p. 467.

Rhypticus saponaceus, Bl. Schn.

- Jaboncillo*, Parra, Difer. Piezas de Hist. Nat. Cuba, p. 51, pl. xxiv, fig. 2, 1787 (Havana).
Anthias saponaceus, Bl. Schn. Syst. Ichth. p. 310, 1801 (Havana), after Parra.
Rhypticus saponaceus, Cuv. & Val. iii, p. 63, 1829 (Brazil; Cape Verde); Günth. Cat. Fish. i, p. 172, 1859 (**Cape of Good Hope**; St. Helena; West Indies; St. Vincent; Jamaica; America), Proc. Zool. Soc. 1868, p. 225 (St. Helena), and *Challenger*, Shore Fish. p. 3, 1880 (St. Vincent); Poey, Synops. p. 297, 1868 (Havana), Enum. Pisc. p. 34, 1875 (Havana), and Faun. Puerto Riqueña, p. 322, 1881 (Porto Rico); Gill, Proc. Ac. Nat. Sc. Philad. 1869, p. 52; Cope, Trans. Amer. Phil. Soc. 1870, p. 467 (St. Croix); Peters, Berlin. Monats. 1876, p. 245 (Victoria, West Africa); Jord. Proc. U.S. Nat. Mus. 1884, p. 35 (Pensacola), Cat. Fish. N. Amer. p. 85, 1885, and Proc. U.S. Nat. Mus. 1886, p. 41 and p. 581 (Havana); Bouleng. Cat. Perc. Fish. i, p. 348, 1895 (**Cape of Good Hope**; St. Helena; St. Vincent; Cape Verde Islds.; Bahia; Trinidad; St. Croix; Jamaica; Bermuda); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 107 (**S. Africa**).
Rhypticus microps, Casteln. Anim. nouv. Amér. Sud, p. 6, 1855 (Bahia), after *Perca microps*, Broussonet, a MS. name.
Rhypticus arenatus (non Cuv. & Val.), Steindr. Sitz. Ak. Wien, lvi, i, 1867, p. 347; Dean & Dresel, Proc. U.S. Nat. Mus. 1884, p. 163 (Jamaica).
Eleutheractis coriaceus, Cope, Trans. Amer. Philos. Soc. xiv, 1870, p. 467, fig. (St. Martin's).
Rypticus coriaceus, Jord. & Eigenm. Bull. U.S. Fish. Comm. viii, 1888, p. 341 (Kingston, Jamaica).
Rypticus saponaceus, Jord. & Eigenm. t.c.p. 340 (Havana; Pensacola; Bahia); Everm. & Marsh, Fish. Porto Rico, in Bull. U.S. Fish. Comm. xx, pt. 1, 1890, p. 163; Jord. & Everm. Fish. N. and Mid. Amer. p. 1232, 1896 (West Indies; Pensacola to West Africa and Brazil; generally common).

Parascorpis, Blkr.

- Bleeker, Arch. Néerl. Sc. Nat. x, 1875, p. 380; Bouleng. Cat. Perc. Fish. i, p. 145, 1895.

Parascorpius typus, Blkr.

(Milk-fish ; Melk-visch.)

Bleeker, Arch. Néerl. x, 1875, p. 381, pl. vii ; Bouleng. Cat. Perc. Fish. i, p. 145, 1895 (**Cape of Good Hope**) Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 106 (**S. Africa**) ; Regan, Col. Fish. in Ann. Natal Govt. Mus. i, pt. 3, 1908, p. 244 (Bird Isld.).

SUB-FAMILY **PRIACANTHINAE**.**Priacanthus**, Cuv.

Priacanthus, Cuv. Règne Anim. ii, p. 281, 1817 ; Blkr. Atlas Ichth. vii, p. 12, 1876, and Arch. Néerl. xi, 1876, p. 251 ; Morrison, Proc. Ac. Nat. Sc. Philad. 1889, p. 160 ; Bouleng. Cat. Perc. Fish. i, p. 351, 1895 ; Jord. & Everm. Fish. N. and Mid. Amer. p. 1237, 1896.

Priacanthus, part, Cuv. & Val. Hist. Nat. Poiss. iii, p. 96, 1829 ; Günth. Cat. Fish. i, p. 215, 1859 ; Jord. & Gilbert, Synops. p. 544, 1883.

Priacanthusboops, Forst.

Anthias boops (Forst.), Bl. Schn. Syst. Ichth. p. 308, 1801.

Priacanthus boops, part, Cuv. & Val. iii, p. 103, 1829.

Priacanthus bonariensis, Cuv. & Val. iii, p. 105, 1829 (Buenos Ayres) ; Günth. Cat. Fish. i, p. 216, 1859 (South America).

Priacanthus japonicus, Cuv. & Val. iii, p. 106, pl. 1, 1829 (Japan) ; Temm. & Schleg. Faun. Japon. Poiss. p. 20, 1844 ; Günth. t.c.p. 217, 1859 (**Cape Seas** ; Japan ; China Sea) ; Steindr. & Döderl. Denskr. Ak. Wein, xlvii, 1883, p. 239, and xlviii, 1883, pl. i, fig. 1.

Priacanthus macropus, Cuv. & Val. vii, p. 469, 1831 (No locality stated) ; Quoy & Gaim. Voy. *Astrolabe*, Zool. iii, p. 668, Poiss. pl. vii, fig. 1, 1834 ; Sauvage, Hist. Madagascar, Poiss. p. 119, pl. xiv, fig. 1, 1891.

Priacanthus macropterus, Cuv. & Val. vii, p. 471, 1831 (No locality stated) ; Quoy & Gaim. t.c.p. 669, fig. 2, 1834.

Perca boops, Forst. Descr. Anim. p. 411 (1774) 1844.

Priacanthus boops ; Barker in Webb & Berth. Iles Canaries, Ichth. p. 12, pl. 3, fig. 2, 1836 ; Peters, Wiegmann. Arch. 1855, p. 238 ; Günth. t.c.p. 216, 1859 (St. Helena ; coast of Mossambique) ; Bouleng. Cat. Perc. Fish. i, p. 357, 1895 (**Cape of Good Hope** ; Muscat ; Japan ; Bay of Tokyo ; China Sea ; South America ; St. Helena) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 108 (**South Africa**).

SUB-FAMILY POMATOMINAE.

Pomatomus, Lacép.

- Pomatomus*, Lacép. Hist. Nat. Poiss. iv, p. 436, 1802 ; Jord. & Everm. Fish. N. and Mid. Amer. p. 946, 1896.
Gonenion, Rafinesque, Caratteri di alcuni nuovi gen. p. 53, 1810.
Lopharis, Rafinesque, t.c.p. 53, 1810.
Temnodon, Cuv. Règne Anim. ed. 2, vol. ii, p. 206, 1829 ; Cuv. & Val. Hist. Nat. Poiss. ix, p. 225, 1833 ; Günth. Cat. Fish. ii, p. 479, 1860.
Sypterus, Eichwald, Fauna Caspio-Caucasana, 1841.
Chromis, (Garden M.S.) Gronov. Syst. ed. Gray, p. 149, 1854.
Cheilodipterus, Bleeker, Nat. Verh. Holl. Maats. Wet V, 2, No. 1, p. 74, 1874 (Not of Lacép. as earlier restricted by Cuvier).
Sparactodon, De Rochebrune, Bull. Sc. Philom. Paris, iv, 1880, p. 159.

Pomatomus saltatrix, Linn.

(Elft ; Blue-fish ; Shad, of Natal.)

- Skipjack*, Catesby, Hist. Nat. Carol. ii, p. 14, pl. 14, 1732 (Carolina).
Perca saltatrix, Linn. Syst. Nat. ed. x, i, p. 293, 1758 (Carolina) ; after *Perca marina saltatrix*, the *Skipjack* of Catesby.
Gasterosteus saltatrix, Linn. t.c. ed. xii, p. 491, 1766 ; Shaw, Gen. Zool. iv, p. 609, 1803.
Perca lophar, Forsk. Descr. Anim. 1775 (Constantinople).
Scomber saltator, Bl. Schn. Syst. Ichth. p. 35, 1801.
Cheilodipterus heptacanthus, Lacép. Hist. Nat. Poiss. iii, p. 542, pl. 21, fig. 3, 1802 (Fort Dauphin, Madagascar).
Pomatomus skib, Lacép. t.c. iv, p. 436, pl. 8, fig. 3, 1802 (Carolina).
Lopharis mediterraneus, Rafinesque, Ind. d'Ittiol. Sicil. p. 17, 1810, after Forskal.
Gonenion serra, Rafinesque, t.c.p. 53, 1810 (Sicily).
Scomber plumbeus, Mitch. Trans. Philos. Soc. New York, i, p. 424, pl. iv, fig. 1, 1815.
Temnodon heptacanthus, Quoy & Gaim. Voy. Uranie and Physicienne, Zool. p. 400, pl. 61, fig. 2 (bad) 1824.
Temnodon saltator, Cuv. & Val. ix, p. 225, pl. 260, 1833 (New York ; Brazil ; Bahia ; Monte Video ; **Cape of Good Hope** ; Madagascar ; Indian Ocean) ; Webb & Berth. Iles Canaries, Poiss. p. 58, pl. 26, fig. 2, 1836 ; Storer, Rept. Ichth. Mass. p. 57, 1839, and Hist. Fish. Mass. p. 159, pl. 15, fig. 1, 1839 ; Nordm. in Demid. Voy. Russ. Mérid. iii, p. 394, 1840 ; Lowe, Trans. Zool. Soc. ii, p. 183 ; Dekay, New York Faun. Fish. p. 136, pl. 26, fig. 81, 1842 ; Baird, Ninth Smithson. Rept. p. 337 ; Gay, Hist. Chile, Zool. ii, p. 244, 1848 ; Guichen. Explor. Algér. Poiss. p. 63, 1850 ;

Valenc. in Cuv. Règne Anim. Ill. Poiss. pl. 56, fig. 3, 1850; Pappe, Synops. Ed. Fish. C.G. Hope, 1853, and 2nd ed. 1866, p. 17 (Often caught in **Table Bay**, particularly in summer); Holbrook, Ichth. S. Carolina, p. 62, pl. 9, fig. 2, 1860; Günth. Cat. Fish. ii, p. 479, 1860 (**Cape Seas**; Australia; Molucca seas; S. America; New York; Lanzarote); Casteln. Mém. Poiss. Afr. Austr. p. 41, 1861 (Malta; Syria; Alexandria; very common at the **Cape** and reported from Natal; found in United States; Brazil; Moluccas, and New Holland; **Table Bay** throughout the summer); Steindr. Ichth. Beitr. 1881; McCoy, Prodr. Zool. Victoria, N.S. Wales xix, 1889, pl. clxxxiii; Perugia, An. Mus. Civ. Genova, x, 1891, p. 616; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 126 (**S. Africa**).

Chromis epicurorum, Gronov. Syst. ed. Gray, p. 149, 1854 (Carolina. "*Piscis sapidissimus et palato epicurorum gratissimum.*")

Sparactodon nainal, De Rochebrune, Bull. Soc. Philom. Paris, p. 159, 1880 (Senegambia).

Pomatomus saltator, Jord. & Gilbert, Synops. p. 448, 1883; Regan, Col. Fish. in Ann. Natal Gov. Mus. i, pt. 3, 1908, p. 244 (Bird Island).

Pomatomus saltatrix, Jord. & Gilbert, Synops. p. 914, 1883; Berg, An. Mus. Nac. Buenos-Aires, iv, 1895, p. 33; Jord. & Everm. Fish. N. and Mid. Amer. p. 946, 1896 (Atlantic and Indian Oceans; widely distributed; of late years very abundant on American Atlantic coast; occasional in the Mediterranean); Waite, Mem. Austr. Mus. iv, pt. 1, 1899, p. 73 (Coast of N.S. Wales); Delfin, Cat. Peces, Chile, p. 55, 1901 (Valparaiso; Patagonia; Monte Video; coast of Florida).

Pomatomus conidens, Cast.

Casteln. Mém. Poiss. Afr. Austr. p. 41, 1861 (**Algoa Bay**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 126 (**S. Africa**).

SUB-FAMILY **AMBASSINAE**.

Ambassis, Commers.

Ambassis, (Commerson) Cuv. & Val. ii, p. 175, 1828; Günth. Cat. Fish. i, p. 224, 1859; Bouleng. Freshw. Fish. Africa, iii, p. 111, 1915.

Bogoda (and *Ambassis*), Bleeker, Nalez. Ichth. Faun. Beng. en Hind., in Verh. Bat. Gen. xxv, 1853.

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Ambassis urotaenia, Blkr.

- Ambassis urotaenia*, Blkr. Nat. Tijds. Ned. Ind. iii, 1852, p. 257 (Amboyna and Ceram), and Atlas Ichth. viii, p. 135, pl. cccxlv, fig. 2, and pl. cccli, fig. 1, 1877; Günth. Cat. Fish. i, p. 224, 1859 (Seas of Amboyna and Wahai); Playf. Fish. Zanz. p. 18, 1866 (Freshwater of Seychelles); M. Web. Zool. Jahrb. Bund x. Heft. 2, 1897, p. 142 (Mouth of Umhloti River, Natal); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 108 (**S. Africa**); Everm. & Seale, Fish. Philippine Islds. p. 75, 1907 (Bacon); Jord. & Rich. Fish. Philippine Archipelago, p. 255, 1908 (Ca'ayan; Ilo'lo); Regan, Trans. Linn. Soc. xii, p. 3, 1908, Name only, p. 254 (Mangrove swamp Mahé, Seychelles).
 ? *Priopis urotaenia*, Seale, Fish. Hongkong, p. 65, 1914 (Hongkong).

SUB-FAMILY THERAPONINAE.

Therapon, Cuv.

- Cuv. Règne Anim. ii, p. 295, 1817; Cuv. & Val. Hist. Nat. Poiss. iii, p. 125, 1829; Günth. Cat. Fish. i, p. 274, 1859; Bouleng. Freshw. Fish. Africa, iii, p. 113, 1915; Ogilby & McCulloch, Rev. Austr. Therapons, in Mem. Queensland Mus. Vol. V, 1916, p. 99.

Therapon jarbua, Forsk.

- Sciaena jarbua*, Forsk. Descr. Anim. p. 50, 1775 (Red Sea); Shaw, Gen. Zool. iv, p. 541, 1803.
Holocentrus servus, Bl. Ausl. Fische, iv, p. 80, pl. ccxxxviii, fig. 1, 1790.
Grammistes servus, Bl. Schn. Syst. Ichth. p. 185, 1801.
Holocentrus jarbua, Lacép. Hist. Nat. Poiss. iv, pp. 348 & 355, 1802 (Arabian Sea; tropical Atlantic; Japan).
Coius trivittatus, Ham. Buch. Fish. Ganges, pp. 92 & 370, 1822.
Therapon timoriensis, Quoy & Gaim. Voy. *Uranie & Physicienne* Poiss. p. 341, 1824.
Therapon servus, Cuv. & Val. iii, p. 125, 1829 (Pondicherry; Malabar; Timor; Moluccas); and vii, p. 479, 1831 (Bombay; Pondicherry); Rüpp. N.W. Fische, p. 95, 1838; Richards, Ann. & Mag. Nat. Hist. 1842, ix, p. 126; Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 50 (Malayo-Molucca Archipelago), and Atlas Ichth. vii, p. 112, pl. xxxiv, fig. 2, 1875; Günth. Cat. Fish. i, p. 278, 1859 (**Cape Seas**; Red Sea; Freshwater of Point de Galle, Ceylon; Madras; India; China; Moluccas; Amboyna; Cape York; Fresh-water Port Essington), and Fische Südsee, p. 26, 1873, and *Challenger*, Shore Fish. 1880

- (Fiji Islds., Levuka & Kandavu ; Somerset) ; Day, F.sh. Malabar, p. 18, 1865 ; Kner, *Novara*, Fische, p. 45, 1865 ; Playf. Fish. Zanz. p. 62, 1866 (Aden ; Zanzibar) ; Peters, Reise Mossambique, iv, p. 10, 1868 ; Regan, Col. Fish. in Ann. Natal Gov. Mus. i, pt. 3, 1908, p. 244 (Durban Bay) ; Jord. Tan. & Snyder. Cat. Fish. Japan, p. 168, 1913 (Coast of Asia ; north to Japan).
- Pterapon trivittatus*, Gray, Ind an Zool. pl. —, fig. 1, 1834.
- Therapon trivittatus*, Cantor, Cat. Malay. Fish. p. 19 1849.
- Therapon jarbua*, Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 729, and Fische Roth. Meer. p. 26, 1884 ; Day, Fish. Ind. p. 69, pl. xviii, fig. 4, 1875 (Red Sea and East coast of Africa, through seas and estuaries of India to Ma'ay Archipelago and North coast of Australia) ; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 110 (**S. Africa**) ; Jord. & Everm. Proc. U.S. Nat. Mus. xxv, 1902, p. 348 (Formosa) ; Steindr. Fische Süd-arab. & Sokotra, p. 7, 1902 (Sokotra) ; Seale, Occ. pap. Bishop Mus. iv, No. 1, 1906, p. 45 (Shortland Isld., Solomons) ; Jord. & Seale, Fish. Samoa, p. 266, 1906 (Samoa ; Fiji ; New Britain ; New Guinea ; Solomon Islds.), and Fish. Luzon & Panay, p. 23, 1907 (Cavite) ; Everm. & Seale, Fish. Philippine Islds., p. 83, 1907 (Bulan ; San Fabian) ; Stead, Add. Fish-Fauna N.S. Wales, No. 1, 1907, p. 15 (Lake Macquarie) ; Jord. & Rich. Fish. Philippine Archip. p. 258, 1908 (Manila ; Calayan ; Ticao Isld.) ; Gilchr. & Thomp. Ann. S. Afr. Mus. vi, pt. 2, 1908, p. 150 (Natal) ; Regan, Trans. Linn. Soc. xii, pt. 3, 1908, p. 254, Name only (Mangrove swamp, Praslin, Seychelles) ; Seale, Fish. Borneo, p. 277, 1910 (Borneo), and Fish. Hongkong, p. 67, 1914 (Hongkong) ; Weber, Fische Aru-Kei Ins. p. 30, 1911 (Aru Islds.) ; Bouleng. Freshw. Fish. Africa, iii, p. 113, 1915 (Red Sea ; Mombasa ; Rovuma River ; Zanzibar ; mouth of **Zambesi** ; Durban, Natal ; to China and North coast of Australia, the Solomon Islds., Samoa and Fiji ; entering rivers).
- Therapon (Datnia) jarbua*, Blkr. Ned. Tijds. Dierk. iv, 1873, Therap. p. 377 (East Indies).

Therapon theraps, Cuv. & Val.

- Therapon theraps*, Cuv. & Val. iii, p. 129, pl. 53, 1829 (Java) ; Rüpp. N.W. Fische, p. 95, 1838 ; Richards. Ann. & Mag. Nat. Hist. 1842, ix, p. 126 ; Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 50 (Malayo-Molucca Archipelago) ; Günth. Cat. Fish. i, p. 274, 1859 (**False Bay** ; India ; East Indies ; Singapore ; Malacca ; Ch'na ; China seas ; Philippines—entering rivers) ; Fische Südsee, p. 26, 1873 ; and *Challenger*, Shore Fish. p. 52, 1880 (Philippines) ; Kner, *Novara*, Fische, p. 44, 1865 ; Day, Fish. Malabar, p. 19, 1865, and Fish. Ind. p. 70, pl. xviii, fig. 6, 1875 [C.P. 3—1916.]

- (East coast Africa, seas of India, through Malay Archipelago to China); Playf. Fish. Zanz. p. 22, 1866 (Zanzibar); Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 728; Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 110 (**S. Africa**); Jord. & Everm. Fish. Formosa, in Proc. U.S. Nat. Mus. xxv, 1903, p. 348 (Keerun); Jord. & Seale, Fish. Samoa, p. 266, 1906 (Caroline Islds.; East Indies), and Fish. Luzon & Panay, p. 24, 1907 (Iloilo) Everm. & Seale, Fish. Philippine Islds. p. 83, 1907 (Bulan; Bacon); Weber, Fische, Aru-Kei-Ins. p. 30, 1911 (Aru Islds.); Seale, Fish. Hongkong, p. 67, 1914 (A common food fish of Hongkong); Ogilby & McCulloch, Revis. Austr. Therapons, in Mem. Queensland Mus. Vol. V, 1916, p. 102 (Port Essington and Port Darwin, North Australia; North-west Australia; Palm Isld. to Flinders Isld., Queensland; Torres Straits).
- Therapon obscurus*, Cuv. & Val. iii, p. 135, 1829 (Indian Seas); Cantor, Cat. Malay, Fish. p. 20, 1849; Günth. Cat. Fish. i, p. 275, 1859 (Sea of Pinang).
- Therapon squalidus*, Cuv. & Val. iii, p. 136, 1829; Günth. t.c.p. 275 (Indian Ocean).
- Therapon transversus*, Cuv. & Val. iii, p. 136, 1829 (Malabar coast).
- Therapon cinereus*, Cuv. & Val. iii, p. 138, 1829 (Indian Seas); Günth. t.c.p. 276 (India).
- Therapon (Datnia) virgatus*, Blkr. Nat. Tijds. Dierk. iv, 1873, Therap. p. 379.

Datnia, Cuv. & Val.

- Datnia*, Cuv. & Val. Hist. Nat. Poiss. iii, p. 139, 1829; Day, Fish. India, p. 71, 1875.
- Mesopristsis* sp., Bleeker, Nat. & Geneesk. Arch. Ned. Ind. ii, 1845.
- Therapon*, part., Günth. Cat. Fish. i, p. 283, 1859.

Datnia argentea, Cuv. & Val.

- Datnia argentea*, Cuv. & Val. iii, p. 139, pl. 54, 1829 (India; Java); Blkr. Verh. Bat. Gen. xxii, 1849, Perc. p. 52 (Malayo-Molucca Archipelago); Day, Fish. Ind. p. 71, pl. xviii, fig. 7, 1875 (**Cape Seas**; seas of India to Malay Archipelago & beyond); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 110 (**S. Africa**).
- Mesopristsis macracanthus*, Blkr. Nat. & Geneesk. Arch. Ned. Ind. ii, 1845, p. 523 (Batavia).
- Datnia cancellatoides*, Blkr. Nat. Tijds. Ned. Ind. iv, 1853, p. 247 (Sumatra), young.
- Therapon argenteus*, Günth. Cat. Fish. i, p. 283, 1859 (**Cape Seas**; Indian Ocean; Amboyna).

Therapon (*Datnia*) *argenteus*, Blkr. Ned. Tijds. Dierk. iv, 1873, Therap. p. 382; not of Kner; Ogilby & McCulloch, Revis. Austr. Therapons, in Mem. Queensland Mus. Vol. V, 1916, p. 115 (Port Moresby, Papua; Normanby Isld., D'Entrecasteaux group, in fresh water; Santo & Erromanga, New Hebrides; Queensland).

SUB-FAMILY CIRRHITINAE.

Cirrhites, Lacép.

*Cirrhit*es, Lacép. Hist. Nat. Poiss. v, p. 3, 1803; Cuv. Règne Anim. 1817; Cuv. & Val. Hist. Nat. Poiss. iii, p. 66, 1829; Günth. Cat. Fish. ii, p. 71, 1860; Jord. & Everm. Fish. N. and Mid. Amer. p. 1491, 1898.
Cirrhitichthys, Günth. t.c.p. 73, 1860; not of Bleeker.

Cirrhites *arcatus*, Cuv. & Val.

Valent. Descrip. Amboin. iii, p. 497, fig. 470, 1726; Renard, Poiss. Moluques, i, pp. 18 & 102, 1754.
*Cirrhit*es *arcatus*, (Parkins) Cuv. & Val. iii, p. 74, 1829; Lesson, Voy. *Coquille*, Zool. ii, p. 227, 1838; Richards. Voy. *Samarang*, Fish. p. 26, pl. 5, figs. 3-5, 1848; Cuv. Règne Anim. Ill. Poiss. pl. 10, fig. 2, 1850; Blkr. Act. Soc. Nederl. i, 1856, Manado en Macassar, p. 41, and Visch. v. d. Kaap, p. 52, Name only, 1860 (**Cape Seas**); Günth. Cat. Fish. ii, p. 72, 1860 (Mauritius), and *Challenger*, Shore Fish. p. 59, 1880 (Reefs at Honolulu); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 118 (**S. Africa**).
*Cirrhit*es *vittatus*, (Valenc.) Cuv. Règne Anim. Ill. Poiss. p. 39, 1850.
*Paracirrhit*es *arcatus*, Jord. & Seale, Fish. Samoa, p. 278, 1906 (Hawaii, New Guinea).

Cirrhites *forsteri*, Bl. Schn.

Seba, Thes. iii, p. 27, 1734; Renard, Poiss. Moluques, i, pp. 9 & 61, 1754.
Perca taeniata, Forst. Descr. Anim. p. 224, 1775.
*Grammist*es *forsteri*, Bl. Schn. Syst. Ichth. p. 191, 1801.
Sparus pantherinus, Lacép. Hist. Nat. Poiss. iv, p. 160, pl. vi, fig. 1, 1802 ("Grand Ocean équinoxial").
*Cirrhit*es *pantherinus*, Cuv. & Val. iii, p. 70, 1829 (Isle de France; Marquesas); Lesson, Voy. "*Coquille*," Zool. Poiss. p. 225, pl. 22, fig. 1, 1838; Blkr. Nat. Tijds. Ned. Ind. ii, 1851, Banda, p. 232.
Serranus tankervilleae, Bennett, Fish. Ceylon, pl. 27, 1830.
[C.P. 3—1916.]

- Cirrhitès forsteri*, Günth. Cat. Fish. ii, p. 71, 1860 (**Cape Seas**; Mauritius; India), and Fische Südsee, t. xlv A. 1884; Gill, Proc. Ac. Nat. Sc. Philad. 1862, p. 112; Playf. Fish. Zanzibar, p. 46, 1866 (Great Comoro); Klunz. Verh. Zool.-bot. Ges. Wien, 1870, p. 797; Day, Fish. Ind. p. 144, pl. xxxv, fig. 4, 1875 (Red Sea; East coast Africa; Andaman Islds.; seas of India to Malay Archipelago and beyond); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 118 (**S. Africa**).
- Amblycirrhites forsteri*, Blkr. Ned. Tijds. Dierk. iii, 1866, p. 175.
- Paracirrhitès forsteri*, Blkr. Verh. Akad. Amst. xv, 1875, Cirrh. p. 6; Seale, Occ. pap. Bishop Mus. iv, No. 1, 1906, p. 51 (Nukuhiva; Marquesas Islds.); Jord. & Seale, Fish. Samoa, p. 278, 1906 (Hawaii, Marquesas Islds.).

SUB-FAMILY PENTACERATINAE.

Pentaceros, Cuv. & Val.

- Pentaceros*, Cuv. & Val. Hist. Nat. Poiss. iii, p. 30, 1829; Günth. Cat. Fish. i, p. 212, 1859.
- Quinquarius*, Jordan, Proc. U.S. Nat. Mus. xxxii, 1907, p. 238.

Pentaceros capensis, Cuv. & Val.

- Cuv. & Val. iii, p. 30, pl. 43, 1829 (**Cape of Good Hope**); Günth. Cat. Fish. i, p. 212, 1859 (**Cape of Good Hope**); Blkr. Visch. v. d. Kaap, p. 52, Name only, 1860 (**Cape Seas**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 108 (**S. Africa**).

Pentaceros richardsonii, Smith.

- Pentaceros richardsonii*, Smith. Ill. Zool. S. Afr. Pisces, pl. 21, 1849 (**Cape Point**); Günth. Cat. Fish. i, p. 212, 1859 (**Cape Point**); Blkr. Visch. v. d. Kaap, p. 52, Name only, 1860 (**Cape Seas**); Gilchr. Cat. Fish. in Mar. Inv. S. Afr. i, 1902, p. 108 (**S. Africa**).
- Pseudopentaceros richardsonii*, Waite, List Fish. New Zealand, in Rec. Canterbury Mus. i, No. 1, 1907, p. 19.

Histiopterus, Temm. & Schleg.

- Temm. & Schleg. Fauna Japon. Poiss. p. 86, 1843.

Histiopterus spinifer, Gilchr.

- Gilchr. Mar. Inv. S. Afr. iii, 1905, p. 3, pl. xxi (**Mossel Bay**, 30-56 fms.).

Corrigenda to Part I.

The following corrections are necessary in Part I. (published in Marine Biological Report, No. 2, for the year ending 30th June, 1914):—

p. 2. Family MYXINE, should be Family MYXINIDAE.

p. 18. Family SQUALIDAE :—

The genus ACANTHIAS, Risso, should be SQUALUS, Linn. and the synonymy (p. 21) as follows :—

Squalus, (*part.*), Linn. Syst. Nat. ed. x, p. 233, 1758.

Squalus, Rafinesque, Caratteri di alcuni nuov. gen. d. Sicilia, p. 13, 1810; Jord. & Everm. Fish. N. and Mid. Amer. p. 53, 1896; Regan, Ann. Natal Govt. Mus. i, 1906, p. 1, and Sharks of the family *Squalidae*, in Ann. & Mag. Nat. Hist. Series 8, vol. ii, 1908, p. 39.

Acanthorinus, Blainville, Journ. de Physique, 1816, p. 263.

Acanthias, Risso, Eur. Mérid. iii, p. 131, 1826.

Entoxychirus, Gill, Proc. Ac. Nat. Sc. Philad. 1862, p. 496.

ACANTHIAS BLAINVILLEI, Risso, should be SQUALUS BLAINVILLEI, Risso.

ACANTHIAS VULGARIS, Risso, should be SQUALUS ACANTHIAS, Linn.



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